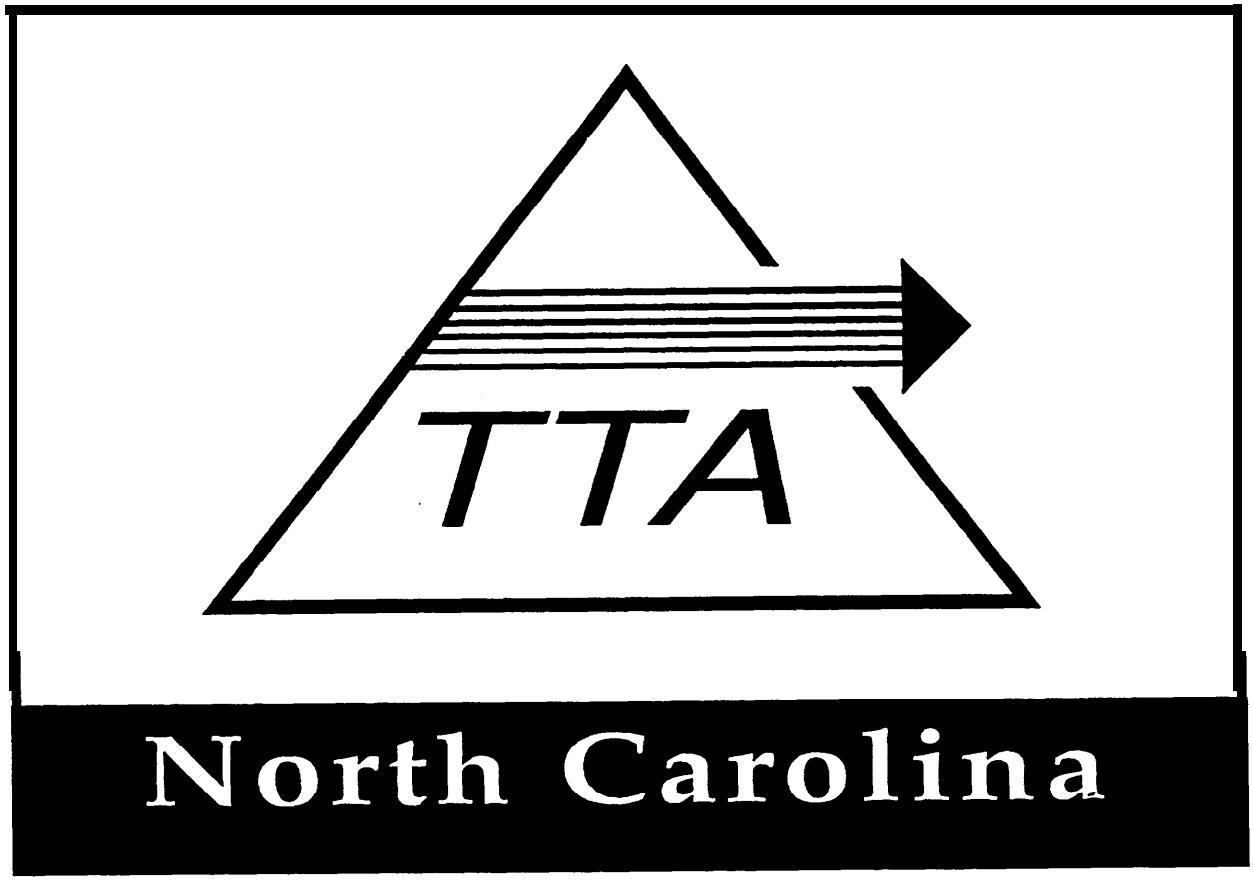
DRAFT REPORT FOR THE

1994 TRAVEL BEHAVIOR SURVEY



Prepared for

Triangle Transit Authority
for the
Research Triangle Region

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Table of Contents

Executive Summary

The Triangle Travel Behavior Survey, an essential element in the regional study of transportation activity and travel patterns, was conducted under the auspices of the Triangle Transit Authority. The data represent the activity and travel behavior of 2,045 Research Triangle area households.

The survey was designed and carried out to accomplish three objectives:

- **Provide up-to-date travel information**

The most recent household travel survey was conducted in the 1960s. Given the significant regional changes since that time, there was an obvious need for more up-to-date information representing the current transportation system.

- **Provide information about household and travel characteristics**

Effective transportation planning starts with a close look at the relationship **between** characteristics of households and travel behavior. Particularly important **for** planning is the link between geographic location or land use and the average number of trips the household typically produces each day. The Triangle Travel Behavior Survey was specifically designed to collect this information.

- **Provide a basls for future projections**

The household travel survey was also designed to provide the type of information that state and local decision makers require when considering future regional transportation needs and investments.

The Study Area

The study focused on the Research Triangle region, which is comprised of Wake, Durham, and Orange counties, with a total estimated population in 1992 of 737,269 persons. In addition, specific areas in Harnett, Chatham, Person, Granville, Franklin, and Johnston counties were included in the study. The study was authorized by the Triangle Transit Authority which **is** responsible for regional transportation planning initiatives. Management overview and technical support was provided through a Steering Committee comprised of NCDOT, Capital **Area** Metropolitan Planning Organization, and Durham Chapel Hill Carrboro Metropolitan Planning Organization staff, as well as representatives from other large units of government within the region.

The Study Methods

The Triangle Travel Behavior Survey provides detailed information about 1,778 randomly selected households and 267 specially recruited transit using households. In total, 2,660 households were recruited for participation in the study. This number reflected a recruitment rate of 47% of study area households. A total of 2,045 households, or 77% of those initially recruited, ultimately completed the survey.

A member of each participating household was initially contacted **by** telephone to collect basic information about the household, such as:

- Number of persons in the household over five years of age,

- Number of vehicles available to the household,
- Number of employed household members,
- Demographic characteristics of the household members.

Following this initial telephone contact, the survey relied upon a widely used method of data collection known as the "trip diary." The Triangle Travel Behavior Survey expanded the trip diary concept (in which specific information is collected about the travel behavior of each member of a household) to include activities performed, as well as trips taken, during a given two-day period.

Each household was assigned two specific "travel days" for which information would be collected. The trip diary format was used to assist both the respondent and the survey researcher. Because the diary approach was highly focused, researchers could obtain detailed information about each trip made by a participating household, such as the total number of trips by household, the origin and destination of each trip, and the type of transportation used.

On the day immediately following the "travel day", researchers telephoned the participants to collect the travel information on each member of the household. Information collected included the origin and destination locations of all trips, departure and arrival times, types of activities and purposes connected with each trip, the type of transportation used, parking costs (if any), etc. The telephone interviews provided the opportunity for the researcher to review and record the diary information, and at the same time, provide assistance or clarification to the respondent if necessary. Table I presents the survey outcomes.

Table I

Survey Execution Outcomes

Total Recruited Households	2,660	Recruitment Rate	47%
Total Completed Households	2,045	Completion Rate	77%
		Overall Response Rate	36%

The Study Findings

A brief discussion of trends and relationships with respect to household characteristics and the travel behavior as determined by the survey follows. Further definition of survey conduct and study findings can be found in the remaining chapters of this report.

Table II contains estimates pertinent to transportation volume for the study area. The study area is comprised of Durham, Orange, and Wake counties, as well as a small number of block groups in each of Harnett, Chatham, Person, Granville, Franklin, and Johnston counties.

Table II

Study Area Transportation Volume Estimates

Total Households	301,035 households
Average Household Size	2.4 persons
Average Number of Vehicles per Household	1.89 vehicles
Total Person Trips Recorded	34,755 trips
Average Person Trip Rate per Household per Day	11.89 trips
Average Activity Rate per Household per Day	18.9 activities
Total Activities Recorded	79,363 Activities
Travel Volume Projection	3,3,567,264.7 trips

Note: Estimate of Total Households is based on 1990 Census, STF-3 files; all other estimates in Table II are based on the present Triangle Travel Survey.

Household Characteristics. Of the households completing the survey, the majority were one and two person households that resided in single family homes as is shown in Figures I and II. Likewise a majority of the survey respondents were homeowners (62.9%). These household demographics were representative of household demographics in the study area, according to 1990 Census data.

Figure I

Household Size Distribution for All Surveyed Households

(n=2045)

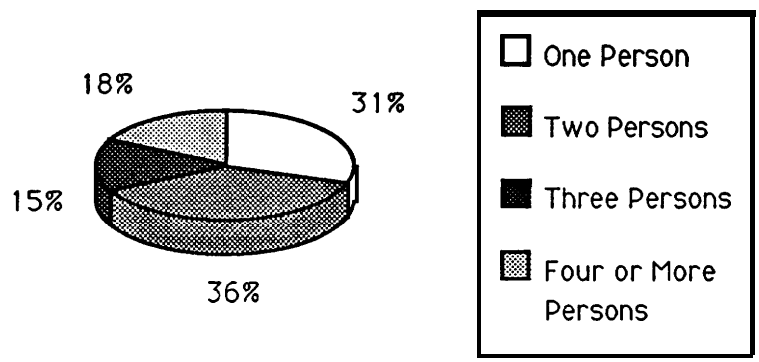
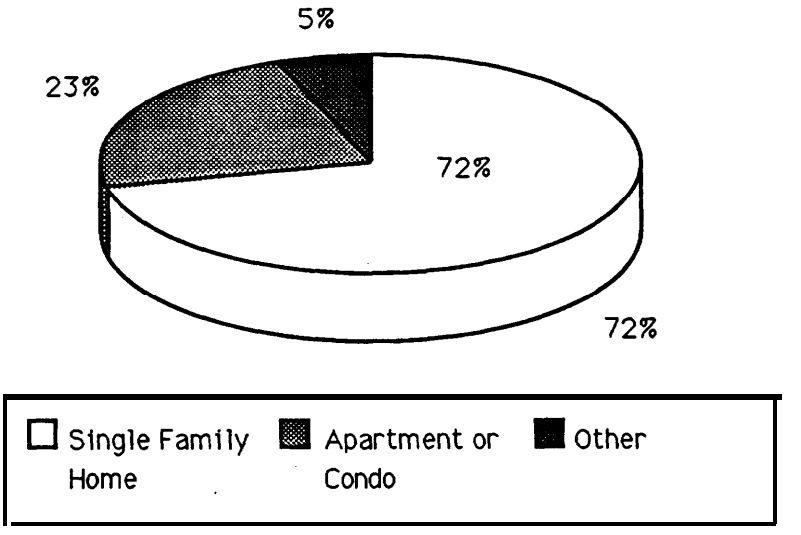


Figure II

Dwelling Type Distribution for All Surveyed Households

(n=2045)

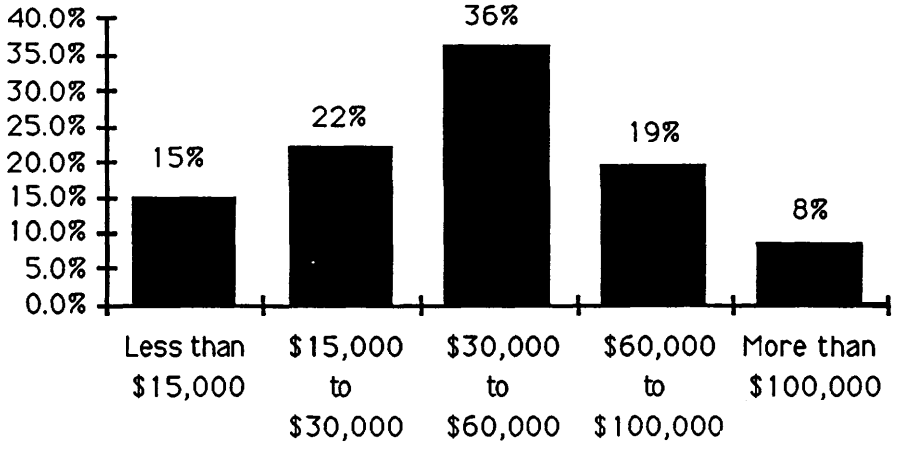


Household income information was not retrieved from all of the 2,045 participating households. Of the 1,733 households who provided this information, the mean household income was within the category of $35,000 to $40,000.

Figure III

Household Income Distribution for All Surveyed Households

(n=1733, Excluding Non-Response)



Trip rates increased with respect to household income. For example, households with:

- Incomes less than $15,000 averaged 7.3 person trips per day,
- Incomes $15,000 to $30,000 averaged 9.0 person trips per day,
- Incomes $30,000 to $60,000 averaged 12.26 person trips per day, and
- Incomes over $60,000 averaged 14.03 person trips per day.

In addition, trip rates increased with respect to autos available. Households with:

- Zero cars available averaged 8 person trips per day,
- One car available averaged 7.8 person trips per day,
- Two cars available averaged 13.12 person trips per day,
- Three cars available averaged 14.7 person trips per day, and
- Four or more cars available averaged 13.6 person trips per day.

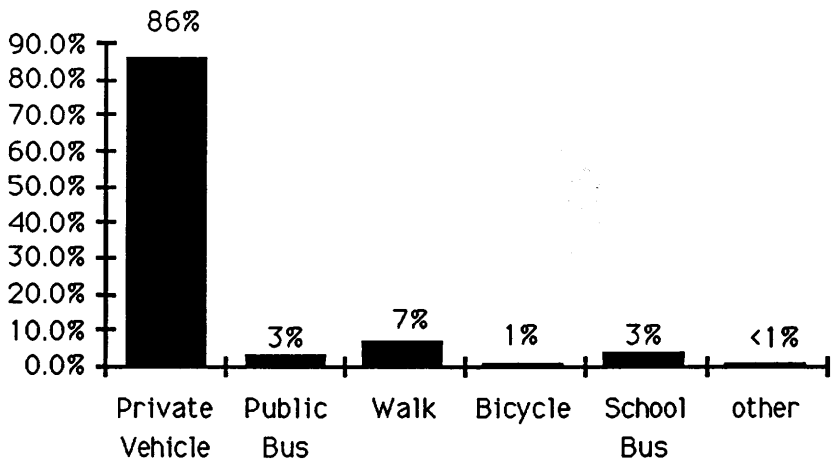
Of the 2,045 households that completed the survey, more than half (53.5%) have lived in the study area for less than 5 years. More than a quarter (27.9%) have lived in the study area for less than two years. Of 1,095 newcomers who have lived in the study area for less than five years, one-fourth (27.3%) previously resided in a state other than North Carolina.

Travel Characteristics. In terms of vehicles per household, about six percent (5.5%) of the households reported not having **any** vehicle routinely available for personal use while the remaining households (94%) indicated the availability of one or more vehicles. As might be expected, the number of vehicles per household increased with the relative number of household members.

Consistent with national patterns, the distribution of trips by mode is shown in Figure IV. Private vehicles were used as the mode of travel in 86% of trips.

Figure IV

Mode Distribution for All Trips Recorded in Diaries



The percentages of walk and bicycle trips may be a result of the age distribution represented by the sample of households. Of persons completing the diaries, 20% were under age 15, 10% were between 15 and 24, 39% were between the ages of 25 and 44,23% were between 45 and 64, and 8% were age 65 or older.

As shown in Table III on the next page, of the more than 29,000 recorded person trips recorded by the randomly sampled households, more than half were return trips home (23%), or trips related to work (18%) or the procurement of meals (17%). The top ten destinations account for almost 97% of all person trips.

TABLE III

Top Ten Trip Destinations For Random Sample Households
n = 1,778 households
n = 29,415 trips

Trip Destination	Count	Percentage
Home	6879	23.4%
Work	5190	17.6%
Meals	4938	16.8%
Shopping	3414	11.6%
Pick up/Drop off passengers	2105	7.2%
School	1720	5.8%
Amusements	1560	5.3%
Visiting with others	1237	4.2%
Household business	1016	3.5%
Religious services	446	1.5%
Other	910	3.4%
Total	29,415	100.0%

Chapter 1 - Introduction

This report documents the design, implementation, and results of the Triangle Travel Behavior Survey. The survey was conducted July 1994 through May 1995, with data collection taking place November 1994 through April 1995.

The Triangle Transit Authority contracted the survey work to NuStats International, in association with Parsons, Brinckerhoff, Quade and Douglas, and Dr. Julian Benjamin of North Carolina A&T University. In this survey, data were gathered on the personal travel behavior of a representative sample of Research Triangle Region residents. The data will be used for transportation policy and planning purposes.

The Triangle Travel Behavior Survey, like all household travel surveys, relied on the willingness of survey area residents to complete diary records of their daily travel and activities. Recruitment of households was conducted through a "recruitment interview" in which respondents were informed of the survey, its purpose, and the respondent obligation to complete diaries. Data on households and household members were also collected during the recruitment interview. Recruitment for the Triangle Travel Behavior Survey was conducted from November 8, 1994 to March 19, 1995. Participating households were assigned "activity and travel" days, which typically occurred 10 days after recruitment, and during which household members were asked to record information in their diaries. Immediately after the assigned date, households were contacted to retrieve the diary information. Retrieval interviews were conducted from November 19, 1994 to April 8, 1995.

In total, 2,660 households were recruited to participate in the study. Of these, 2,045 households completed activity and travel diaries, and the information was retrieved from all household members age five and older.

The Triangle Travel Behavior Survey produced activity and trip information from 4,610 persons five years of age or older residing within households in the Research Triangle Region. The survey instruments collected data on household characteristics, person characteristics, data on employment and school attendance, vehicles, activities, and trips. Rather than collecting information on all activities conducted by household members, this survey focused on activities that involve travel or could involve travel.

The survey used a scientifically formulated sample design, appropriate instruments for data collection, a package of written materials to communicate with survey respondents, a toll-free survey hotline, and data collection, processing, and reporting procedures that comported to standards of the Council of American Survey Research Organizations (CASRO).

In addition, this survey was designed with several state-of-the-art, survey design features. These features are discussed below.

ReportIng Format. Traditionally, household travel surveys have focused on travel. The typical question in such surveys had the form, "Where did you go?" followed by questions about the trip. The Triangle Travel Behavior Survey collected activity as well as travel data. Lawton and Pas (1995) provide a list of reasons for collecting activity data.1 These reasons include:

- To understand and model travel as a derived demand by focusing on activities that are linked by trips;

[1] Resource paper prepared for the Conference on New Concepts in Household Travel Surveys: New Concepts and Research Needs, sponsored by the Transportation Research Board, March 1995.

- To place travel in the context of the respondent's day and so to facilitate recall of short, infrequent trips;
- **To** examine in-home activity substitution under constrained transportation supply *Of* increased costs.

Reporting Period. Historically, respondents in household travel surveys were asked to report their travel **behavior** for a 24-hour period. The Triangle Travel **Behavior** Survey collected activity and travel data for a 48-hour period. The rationale for lengthening the reporting period was to capture day-to-day variation in personal travel behavior.

Rare Behavior Sampling. The present survey also included an enrichment sample of transit users. Such choice-based sampling was used to ensure the inclusion of households undertaking a "rare" behavior (i.e., transit use) in the sample.

The Triangle Travel Behavior Survey was successfully completed, and the results are reasonable. The survey achieved a valid sample of households as compared to the 1990 Census, recognizing that some demographic changes have occurred between 1990 and 1994.

This report describes survey execution 'and presents the results. It is organized into chapters by major topic. The remaining chapters include:

Chapter 2 Sample Design
Chapter 3 Instrument Design and Pilot Test Results
Chapter 4 Data Collection Procedures
Chapter 5 Data Production Procedures
Chapter 6 Geographic Coding Procedures
Chapter 7 Survey Results
Chapter 8 Transit Sample Characteristics

Appendices are located at the end of the report. The appendices are:

Appendix **A** Pilot Test Materials
Appendix B Survey Materials.

Data file documentation (data file structures, variable and value labels, and frequencies and descriptive statistics) are presented in four separate volumes - Household Data File, Person Data File, Vehicle Data File, and Activity Data File.

Chapter 2- Sample Design

Survey Population

The universe for the Triangle Travel Behavior Survey consists of households in the counties of Orange, Durham, and Wake, as well as specific block groups in Hamett, Chatham, Person, Granville, Franklin, and Johnston counties. For purposes of the survey, a household was defined as "all persons five years of age or older currently living in the same dwelling who typically share meals, as well as income."

The size of the total universe was defined by the total number of households in the study area. There were 301,035 household units in the study area, according to 1990 Census STF-3A data.

Sample Type

The survey used a stratified random sample, which is a probability sample design. It **is** desirable and conventional to use a probability sample for any survey which is designed to estimate the absolute incidence and dimensions of a characteristic within a defined population (i.e., to generalize to the universe). Probability samples are the only ones for which standard errors or measures of precision can be calculated.

In stratified sampling, sample pieces are drawn from homogeneous subsets of the universe. In the Triangle Travel Behavior Survey, the universe was stratified on geographic location. The effect of stratification was to ensure the proper representation of the stratification variable (i.e., geographic location) in order to enhance the representation of other variables related to it (i.e., trip rates, mode choice). Thus, the present survey design ensured adequate representation of households in urban, suburban, and rural areas so that travel behavior differences associated with such households could be modeled for planning and policy purposes.

The Request for Proposal (RFP) had suggested that a sample stratified on five residential location categories (i.e., urban, exurban/rural, suburban, high density urban, and universities) be used. The survey used three geographic strata - urban, suburban, and rural. This change was made by the Triangle Transit Authority based on discussions with the Steering Committee for the Triangle Travel Survey, upon consideration of three objectives for stratification definition provided by NuStats. These criteria were: (1) the stratification definitions should be based on objective criteria, (2) the criteria should be ones that could be forecast for future years, and (3) the stratification definitions should distinguish areas where travel behavior differs.

The actual work of defining the stratification areas was carried out by the Triangle Transit Authority and TJCOG staff using Census STF-3A housing counts and TIGER line files for the region on GISPLUS mapping software. The Triangle Travel Behavior Survey used three sample strata that are defined by density (i.e., households per square mile) as noted below.

- Urban Greater than 1920 households per square mile
- Suburban 133 to 1920 households per square mile
- Rural 0 to 133 households per square mile.

Sample Size

The RFP specified that the total sample size be driven by the ability to estimate household trip rates for each stratum within plus/minus ten percent at the 90% confidence level. It was

desired that sample be drawn from each stratum proportionate to the distribution of households in the universe. NuStats recommended a total sample of 2,000. Four hundred of these sampled households were to be transit users. The sample of 1,600 would be stratified on the basis of geographic location. The urban stratum would comprise 14.9% **(or 238** households), suburban would comprise 56.5% (or 904 households), and rural would comprise 28.6% (or 458 households). The precision of the smallest sample allocation of 238 households is within the requirements set by the RFP. A sample size of 237 will provide precision of the estimates at plus or minus 5 percent at the 90 percent confidence level. The sample size of 1,600 provided accuracy of plus or minus 2 percent, with a 90 percent confidence level.

Based on Steering Committee input, it was decided that stratification of actual sampled households would be done in two stages. At stage one, all sample pieces would be assigned a stratum code as defined above. At stage two, the assignment of the stratum code may change based on visual observation of the household's environment during a detailed urban design windshield survey to be conducted in late 1995.

Table 1 presents the distribution of households, the expected sample sizes, and achieved sample sizes among the strata. As indicated, a proportionate random sample was drawn from each stratum. In addition, Table 1 indicates that the achieved sample size by stratum was very close to the expected sample size due to precise sampling and rigorous sample management. The close match of the achieved and expected samples precluded the need for post-hoc weighting of the data on the stratum variable.

TABLE 1

Distribution of Households, Sample Allocation, and Completed Surveys by Stratum (Unweighted Data)

Stratum	Total No. of Households	Percentage of Total Households	Expected Sample Size	Achieved Sample Size
Urban	44,651	14.8%	237 **(14.8%)**	261 **(14.7%)**
Suburban	169,855	56.4%	902 **(56.4%)**	1081 **(60.8%)**
Rural	86,529	28.8%	461 **(28.8%)**	436 **(24.5%)**
Total	301,035	100%	1600	1778

Source: 1990 Census, STF-3 files

Sampling Frame

A sampling frame is the list of elements from which a probability sample is selected. Properly drawn samples provide information appropriate for describing the population of elements that comprise the sampling frame - nothing more. The sampling frame for the Triangle Travel Behavior Survey were listed and unlisted telephone numbers, drawn in proportion to their distribution in the study area. Listed telephone numbers had the name and address **of** the householder associated with them. Unlisted numbers were generated using Random Digit Dial (RDD) procedures.

Numbers were generated by computer at Survey Sampling, Inc. and screened for unused telephone blocks and for business and government listings. Because of the frame used, non-telephone households were excluded. These households were dealt with in the special manner as noted below.

Non-Telephone Households

The 1990 Census was used to obtain the total number of telephone. households for the study area. It was determined that the study area had very high levels **of** telephone coverage. Table 2 presents the percentages of households with telephones in the three primary counties of the survey area.

TABLE 2

Telephone Coverage In the Research Triangle Area

County	**No. of** Households	Percentage of Telephone Households
Wake County	180,000	96.6%
Durham County	76,400	94.8%
Orange County	38,800	96.4%

Source: Survey Sampling, Inc., 1994

The **original scope of** work assumed that NuStats would interview **100 non-telephone** households. During a meeting between NuStats and the Steering **Committee, it was decided that the costs of interviewing non-telephone** households **via door-to-door methods would** outweigh the benefits - given the small proportion of non-telephone households in the study **area. The incidence of non-telephone** households was calculated to be approximately 3.5 **percent** (see Table 2 above). However, certain pockets of the survey area (e.g., the Durham **inner-city) had** significantly higher rates of non-telephone ownership. The Steering Committee felt that it would be important to represent such "pockets" in the survey sample. To do this, NuStats proposed the following data ascription technique.

Data for non-telephone households were to be ascribed from households in the telephone sample that are comparable to non-telephone households. The use of data ascription to account for non-telephone households relies on two assumptions. First, telephone ownership is an episodic phenomenon. Very few households are chronically without **a telephone.** Households tend to go in and out of telephone service. The reasons a household may be without telephone service vary from "just moved and not gotten service yet" **or** "just did not want it" to "disconnected **for** non-payment" and "just trying to save money." Second, households without telephones are homogenous with respect to certain traits. Characteristics such as **low** household income, Black race and Hispanic origin, or unemployment, are consistently associated **with non-telephone ownership.** Because telephone ownership is dynamic and **non-**telephone households are homogenous, reliable non-telephone proxies among the telephone sample can be identified.

A simple questionnaire item was developed to measure telephone ownership as an episodic concept. "Thinking about the last 12 months, have there been times, **even for a few days, when** you did not have phone service at your home for any reason?" If "yes", a follow-up question

was asked, “How long were you without phone service?” With an incidence of 3.5 percent, an expected participation rate of 50 percent, and an expected completion rate of 75 percent, we expected to have approximately 26 episodic non-telephone cases in our achieved sample.

The questionnaire items above were used to flag households that had been without telephone service. Of the 2,660 households recruited to participate in the sample, I9 households responded that their telephone service had been interrupted during the last year for more than three months (which is how “episodic” non-telephone households were defined). **Of** these I9 recruited households, I4 households eventually provided travel and activity information.

Fourteen cases were deemed too small of a sample from which to derive reliable estimates for weighting and ascription. However, these cases provide insight into the characteristics of non-telephone households in the survey area. The characteristics of these fourteen households were compared to the characteristics of households with telephones to ascertain unique characteristics (see Tables 3-5 below). The episodic non-telephone sample displayed small differences in person trip and activity rates, but visible differences in household characteristics.

TABLE 3

Person Trip and Activity Rates Non-Telephone and Telephone Households Compared

	Episodic Non-Telephone Sample (n=19)	Telephone Sample (n=2045)
Average Trip Rate per Household		
Day 1	12.69	12.49
Day 2	11.38	12.28
Avg. 2 Day	12.04	12.30
Average Activity Rate per Household		
Day 1	17.92	18.61
Day 2	16.69	18.25
Avg. 2 Day	17.31	18.43

TABLE 4

Household Income Non-Telephone and Telephone Households Compared

	Episodic Non-Telephone Sample (n=19)	Telephone Sample (n=2045)
Household Income*		
Less than $25,000	22.1%	21.5%
$25,000 to $49,999	46.2%	34.2%
$50,000 or More	31.7%	44.3%
	100.0%	100.0%

Excludes those who did not report household income.

TABLE 5

Household Size Non-Telephone and Telephone Households Compared

	Episodic Non-Telephone Sample (n=19)	Telephone Sample (n=2045)
One	21.4%	30.5%
Two	35.7%	36.9%
Three	14.3%	15.0%
Four or More	28.6%	17.6%
	100.0%	100.0%

Transit Using Households

The Triangle Travel Behavior Survey included an enrichment sample of transit using households to ensure that this behavior would be represented in the final data set in sufficient numbers to permit reliable analysis. For purposes of this survey, a transit using household is one in which "one or more persons (18 years or older) in the household use transit three (3) or more days per week." The recruitment interview was used to identify such households

occurring naturally in the telephone sample. This number totaled 140 households. Of the 140 recruited households, IO6 completed the survey.

In addition, a sample enrichment of 267 transit users was also included in the sample design. This sample was recruited in early December. The transit users recruitment intercept methodology was as follows.

I. Surveyors were stationed at designated transit centers and bus stops **for** three days (Tuesday through Thursday) from approximately 6am to I lam and again from 2pm to 7pm.

2. Surveyors distributed passes to transit riders, at the same time, gathering name, address, and telephone information.

3. Once all contact information had been entered into a database, a unique sample number was assigned to each piece of sample that identified it as a transit user. Once this was done, each transit sample piece was managed in the same manner as the random sample.

The transit user subsample in the final data set totaled 373 households, which was comprised of IO6 random sample households and 267 enrichment sample households.

The execution of the proposed sampling method resulted in the data set described in Table 6 on the following page.

TABLE 6

Final Sample Numbers by Sample Type

Sample Type	Recruitment Numbers	Retrieval Numbers
Urban	330	261
Suburban	1370	1081
Rural	617	436
Transit Enrichment	343	267
Total Sample	**2,660**	**2,045**
Transit Random	(140)	(106)
Non-Telephone	(19)	(14)

Chapter 3- Instrument Design and Pilot Test

The Triangle Transit Authority required sufficient information on household travel behavior to develop robust models for forecasting future transportation alternatives. The Triangle Travel Behavior **Survey** materials were specifically designed to collect this information. The primary survey instrument consisted of (I) a telephone recruitment questionnaire, (2) a self-administered diary log, and (3) a telephone retrieval questionnaire. Important, but auxiliary, survey materials were: (I) a press release, (2) an introductory letter, and (3) a package **of** materials that accompanied the diary.

Figure **1** presents the sequence in which these materials were used. Timing and control **of** the distribution of these materials is critical in a survey of this type to ensure that once recruited, the maximum number of households actually complete the survey. Each of the items in the sequence will be discussed fully in the following sections.

FIGURE 1

Survey Materials Sequence

Material	Household Contact	Timing*	Instrument Type	Objective
Press Release	No	0 minus 21	Mail	a) create awareness of survey
Advance Letter	Yes	0 minus 14	Mail	a) promote the survey and objectives
Recruitment Interview	Yes	0 minus 9	Phone & CATI**	a) secure cooperation
				b) secure/confirm address
				c) collect household & person data
Survey Package	Yes	0 minus 6	Mail	a) Place diary in household
				b) provide letter of explanation
				c) provide set of instructions
Reminder Call	Yes	0 minus 2	Phone	a) ensure participation
Diary Day 1	No	0 minus 1	Self-administered	a) record activities
Diary Day 2	No	0	Self-administered	a) record activities
Retrieval Interview	Yes	0 plus 1	Phone	a) retrieve activity & travel data

** Timing uses the activity or travel date as the base. It is identified as "day 0". All other activities must be timed before or after this critical date.*

*** CATI is Computer-Assisted Telephone Interviewing.*

Press Release

Local elected officials, public officials, media offices, colleges and universities received a press release about the Triangle Travel Behavior Survey approximately two weeks prior to the beginning of the recruitment phase of data collection. The press release offered general information about the survey and promoted participation in the upcoming months. The purpose of the press release was to inform as many relevant entities as possible about the upcoming survey in an effort to increase participation and mitigate any potential concerns.

Advance Letter

The sampling frame contained listed and unlisted telephone numbers. One benefit of listed sample is that it is associated with a particular household and contains the name and address of the householder. All households included in the listed sample were mailed **a** letter **of** introduction to the survey. Table 7 shows the portion of households in the sample that received letters of introduction.

TABLE 7

Number of Letters of Introduction Mailed by Stratum

Stratum	Total No. of Sample	Number of Letters Mailed	Percent of Stratum
Urban	1486	1208	81%
Suburban	6056	4638	77%
Rural	3747	2204	59%
Total	11289	8050	71%

It appears that the advance letter had a positive effect on survey participation (see Table 8). The analysis performed to assess whether households that received a letter of introduction were more likely **to** participate in the survey is the chi-square (X2) test, **a** frequently used test of significance. It tests the null hypothesis, namely that there is no relationship between two variables in the total population.

Using these observed values, the "expected" distribution was computed and compared to the "observed" distribution. These values were computed for both recruitment and retrieval, as shown **on** the next page.

The computed chi-square values are 28.2 and 25.06. The probability of getting values of this magnitude is less than .001, assuming random sampling has been used and there **is no** relationship in the population. Because it is so improbable that the observed relationship could have resulted from sampling error alone, we reject the null hypothesis and assume that a relationship does in fact exist.

While the advance letter is the distinguishing characteristic between these two sample types, an intervening relationship related to listed/unlisted status may also exist that affects participation in the survey. Further and more rigorous research to test the effect **of** advance letters on survey participation is needed.

TABLE 8
Effect of Letter of Introduction on Survey Participation

Sample Type	Total	Recruited	Retrieved
Listed	8050 (71%)	1761 (76%)	1364 (76%)
Unlisted	3239 (29%)	556 (24%)	422 (24%)
Total	11,289	2,317	1,778

	Listed	Unlisted	
1. Expected Frequencies			
Recruited	2317 (71%) =1645	2317 (29%) =672	
Retrieved	1786 (71%) =1268	1786 (29%) =517	
2. Observed Frequencies			
Recruited	1761	556	
Retrieved	1364	422	
3. (Observed - Expected)2 / Expected			
Recruited	8.18	20.02	X2 = 28.2 p < .001
Retrieved	7.27	17.79	X2 = 25.06 p < .001

Instruments

Recruitment. The recruitment instrument was designed to be administered using Computer-Assisted Telephone Interviewing (CATI) procedures. The survey form was actually a computer program covering household and person data. One of the most important elements in the recruitment instrument is the introductory script which is specially worded to garner the cooperation of survey area residents. The data elements included in the final recruitment instrument are presented in Figure 2.

FIGURE 2

Recruitment Data Elements

Household Data Elements	Person Data Elements
Address/telephone number	Sex
Activity/travel dates	Age
Type of residence	Licensed to drive
Length of time at address	Employment status
Previous address	Student status
Household size (total and 5+ years)	Relationship to head of household
Number of persons employed	Transportation disabilities
Owner/renter status	
Number of phone lines	For those employed:
Number of dedicated fax/modem lines	Location of work place
Continuity of phone service	Mode to work
Number of vehicles available	Work schedule
Year, make, model, fuel type of vehicles	Previous city of employment
Total annual income	Cost of parking
	Occupation
	Duration of current employment
	For those attending school:
	Location of school
	Mode to school
	Class schedule

Diary Log. The diary log that was used in the Triangle Travel Behavior Survey was checkbook size and contained only information that was deemed a priority for respondents to record during their activity and travel days. This information included:

- What the activity was,
- Where it took place,
- Activity start and end times,
- How the respondent traveled to the next activity,
- Travel start and end times,
- Number of persons if a private vehicle was used,
- Route or cross-streets and transfer information if a public bus was used.

For purposes of this survey, the universe of activities was categorized as three types: (1) activities that involve travel, (2) activities that could involve travel, and (3) activities that do not involve travel. The survey was designed to gather information only on types 1 and 2 - those activities that involve travel or could involve travel. Figure 3 presents the list of activities that respondents were asked to record.

FIGURE 3

Activities to be Recorded in Diary

Specific Activities Recorded:	"Home" Recorded for the following:
Amusements, games	Childrearing
Banking	Family care/conversations
Church	Housework
Cultural events	Home repair
Driving for pleasure	Personal care (hygiene)
Eating meals	Reading for pleasure
Exercise	Resting, relaxing, sleep
Hobbies	Yardwork
Medical or health care	
Meetings (social, business)	
Personal business (bills, etc.)	
Pick-up/Drop-off passengers	
Repair services	
Retail services (laundry, barber, dry cleaning)	
Shopping	
Sports, athletics	
School, daycare, library	
Special events (wedding, banquet)	
Visiting (in-person, telephone, e-mail)	
Watching TV or movies	
Work or Employment-related	

Retrieval. Collection of activity and travel data consisted of a structured interview with the original respondent who was recruited and/or another adult in the household. The interview was recorded with paper and pencil on a specially designed instrument that guided the interviewer to probe for the specific data elements.

Retrieval interviews were conducted up to eight days after the respondent had actually recorded activities and travel, using the completed diaries whenever possible. In certain instances individuals who had misplaced or discarded their diaries were guided through an exercise of recalling specific activities and travel for another 48-hour period that had occurred within the previous 5 days.

The data elements in the retrieval instrument are presented in Figure 4.

FIGURE 4

Retrieval Data Elements

Activity Data Elements	Additional Elements
Activity type	Vehicle odometer readings
Address/location of activity	Commercial deliveries
Activity start time	
Activity end time	
Travel to next activity	
Travel mode	
Travel start time	
Travel end time	
Vehicle used	
Driver or passenger	
Total number of passengers	
Park more than a block from activity	
Pay for parking	
Amount of parking payment	
Bus route	
Bus transfer	
Method of payment	

Quality control in retrieval consisted of interviewer monitoring and feedback, on-the-spot editing of completed surveys by research assistants, validation, and editing in the days following interview completion. All survey materials discussed in this chapter are included in Appendix B. These processes are discussed more fully in Chapter 5.

Instrument Testing and Revisions

Because activity diaries and the associated telephone interviews contained some relatively new items pertaining to household travel surveys, the scope of work included testing of these materials in focus groups in the Triangle Region as well as a pilot test.

Focus Groups. Two focus groups were held on Thursday, September 15, 1994 to test survey respondent materials and to aid in design and development. These materials included (1) a letter sent in advance of the recruitment call, (2) a diary to log activities and travel, and (3) a letter sent with the diary package. A secondary objective was to examine participants' attitudes about survey participation. Materials used during the focus groups are included as Appendix A.

Participants for the two groups were recruited to reflect population subgroups among whom low response rates in prior travel surveys had been recorded. The first group was comprised of 10 participants who were representative of low-income households. This group included five males and five females; two African Americans and eight white, non-Hispanics. Group 2 was comprised of 10 participants, who were either young adults (ages 20-28) and/or individuals who reside in multi-family dwellings. Nine of the ten participants were between **the** ages **of 20 and** 28 and all ten resided in multi-family housing. Two participants were students. **All were white,** non-Hispanic.

Participants said that their participation in telephone surveys could be enhanced by the following:

- Personality of the interviewer; must be upbeat and friendly.
- Purpose of survey explained quickly.
- Interest in topic; interest in what sponsor of research would do with the information.
- Short survey - no more than 15 minutes.

Participants said that their participation in mail surveys could be enhanced by:

- Some type of compensation.
- Interest in topic.
- Quick and easy to complete survey; check-off boxes.
- Return envelope and postage.

Participants offered several suggestions for making the diary log easier to use.

- Reduce size of diary so it can be put in pocket and carried like a pocket planner.
- Have check-off codes for activities.
- Reduce amount of text on diary pages.
- Clarify the connection between activities and travel.
- Have short, concise instructions for filling out the diary.

Participants offered suggestions for improving the letters associated with the survey.

- Write letter in active voice.
- Include hook as first sentence, including issues about traffic congestion.
- Make the connection between transportation and activities.
- Identify all local government sponsors.

Focus group findings were used to revise the respondent materials. The diary log was converted to a pocket planner type format (e.g., horizontal rather than vertical items) with check-off items for most common activities. The letters were revised to better reflect the concerns voiced by area residents.

Pilot Test. A pilot test of instruments was held from September 14 through October 4, 1994. The pilot test data represented a total of 70 households located within Durham, Orange, and Wake counties.

The pilot was conducted in two phases, using the same general methodology as the actual survey. Forty-one households participated in Phase One (September 14 to September 23,

1994), and twenty-nine participated in Phase Two (September 23 to October 4, 1994), including 17 "planted" participants from the Triangle Transit Authority and other sponsoring agencies. Methodology was the same for both phases, with the exception that the twenty-nine households in Phase Two received an advance letter that explained the purpose of the survey and notified the respondent that an interviewer would be calling within the next day or two.

Response Rates during the Pilot Test. To calculate a response rate, **a** disposition was recorded for each sample piece, by attempting to determine eligibility for each element **in** the frame. As is shown in Table 9, call attempts yielded three types of sample dispositions:

(1) eligible,

(2) non-eligible,

(3) unknown or not ascertained.

In calculating the response rate, the "unknowns" (n=425) were distributed in the ratio of **(1)** eligible, to (2) non-eligible, to estimate the total number of eligible households in the sample. When this was done using the dispositions of the present survey, the number of eligibles was increased from 258 to 606 (due to 348 "unknowns"). Using these numbers, the **recruitment rate** was calculated using the following formula.

$$\text{Recruitment rate: } = \frac{\text{Number of Recruited Households}}{\text{Eligible Households in Sample}}$$

- Number of recruited households = 70
- The number of eligible households in the sample = 606 (70+188+348)
- Recruitment rate = 70/ 606 or 12 percent

TABLE 9

Sample Dispositions for Recruitment

	PHASE ONE		PHASE TWO		
	Number	Percent	Number	Percent	Total Percent
Eligible Sample (258)					**34.9%**
Recruited (70)	41	9.4%	29	9.6%	
Qualified Refusals (188)	106	24.2%	82	27.1%	
Eligibility Unknown (425)					**57.4%**
No Answer	127	29.0%	90	29.8%	
Busy	20	4.6%	15	5.0%	
Answering Machine	12	2.7%	19	6.3%	
Callback	87	19.9%	55	18.3%	
Non-eligible Sample (57))					**7.7%**
Fax/Deaf	7	1.6%	2	0.7%	
Business/Government	36	7.2%	2	0.7%	
Disconnected Numbers	2	0.5%	8	2.65%	
Total Call Attempts	438	100.00%	302	100.00%	

Several key "inputs" of recruitment rate production could not be fully tested because of the compressed timetable of the recruitment effort in each of the two phases of the pilot study. For example, we had more time to turn around refusals and to contact "eligibility unknown" sample during the actual survey. This sample also was kept for a longer period, and up to 6 attempts were made to the sample. The effect of the compressed time frame can be seen in the difference between the pilot recruitment rate (12%) and that achieved in the actual survey (47%).

The **completion rate** is the rate at which recruited households complete the survey process. It is a measure of sample attrition, which can introduce bias into the sample. The completion rate is calculated by dividing the total number of completed surveys by the total number of recruited households. Of the 70 households recruited, 35 completed their surveys, **for a** completion rate of 50.0%.

Household Data. The following questions were asked in the pilot test about the household as a unit (see Tables 10-14). Two types of data are shown for each question: data from all recruited households and data from households that completed their surveys.

TABLE 10
Household Income Distribution in Pilot Test

Income	Pilot Recruited Households n=70	Pilot Completed Households n=29
$0-$24,999	15.9%	10.2%
$25,000-49,999	34.6%	41.3%
$50,000 or more	26.3%	24.4%
Don't Know/Refused	23.2%	24.1%

TABLE 11
Household Size Distribution in Pilot Test

Household Size	Pilot Recruited Households n=70	Pilot Completed Households n=29
One	20.0%	34.5%
Two	38.6%	31.0%
Three	22.9%	13.8%
Four or more	18.5%	20.7%

TABLE 12

Type of Dwelling Distribution in Pilot Test

Type of Dwelling	Pilot Recruited Households n = 70	Pilot Completed Households n = 29
Single Family Home	75.7%	62.1%
Apartment	11.4%	17.2%
Other	11.5%	17.3%
Refused to Answer	1.4%	3.4%

TABLE 13

Ownership Status Distribution in Pilot Test

Ownership Status	Pilot Recruited Households n = 70	Pilot Completed Households n = 29
Own/Buying	78.6%	69.0%
Rent	21.4%	31.0%

Person Data. About 45.2% of the 169 aggregate recruited household members were male, while the remaining 54.8% were female. In the 29 completed households, there **were 64** persons, of which 45.3% were male, and 54.7% were female.

TABLE 14

Age of Household Members Distribution in Pilot Test

Age	Pilot Recruited Households n=169	Pilot Completed Households n=64
0-19 years	24.5%	20.6%
20-44 years	46.1%	52.0%
45-64 years	24.0%	25.2%
64 or older	5.4%	2.2%

Activity and Travel Data. Twenty-nine households provided activity and travel data for the pilot test. Summary tables of these key findings are presented in Tables 15 and 16.

TABLE 15

Activity and Person Trip Rates in Pilot Test

Pilot Test Average Trip Rates	Activities	Person Trips
Day One	15.57	9.11
Day Two	15.31	8.49
Total	30.89	17.60

The five most frequently named activities included at home activities, meals, work, shopping, and pick-up/drop-off passengers.

TABLE 16

Activities Reported In Pilot Test
(n=677 activities)

Activity	Frequency	Percent
Home	219	32.4%
Meals	157	23.2%
Work	92	13.6%
Shopping (general)	39	5.8%
Pick-up/Drop-off passenger	31	4.6%
Social Activities	28	4.1%
Amusements	25	3.7%
School	20	3.0%
Personal Services	16	2.4%
Household Business	14	2.1%
Medical Services	13	1.9%
Cultural Activities	10	1.5%
Changing Modes	5	0.7%
Going for a Drive	3	0.4%
Professional Services	2	0.3%
Religious Services	1	0.1%
Sports Activities	1	0.1%
Civic Activities	1	0.1%

Debriefing of Respondents and Interviewers

Respondents were asked several questions at the end of the retrieval interview that served to evaluate the diary. These questions pertained to their use of the diary, whether they carried it around, and what they liked and disliked about the diary. The results were as follows.

The vast majority of respondents said they used the diaries. We realize that **it is likely** that these respondents represent a self-selected group. Persons who did **not use the diaries or record** their activities and travel were not considered "completes."

Most respondents said they did not carry around the diary with them during the day. They would use a sheet a paper during the day, or more likely, they would record their activities at the end of the day. The end-of-day recording may affect recall of activity addresses, which was a **problem** noted by some interviewers.

The majority **of** respondents said they liked the diary. The general perception **among** "completers" was that it was easy to complete, well-organized, and facilitated the recording of activities and travel.

A minority of respondents had specific complaints about the diary. Several 'said they needed space to record more than eight activities. Several individuals stated that "what constitutes an activity" needs to be clarified. A couple complained that it was too big to carry around.

Interviewers were asked several questions about their perception of the respondents' use of the diaries. These questions were whether the respondent understood how to use the diary, whether they got activity information directly from all household members, and how we could gather more accurate information.

Ail interviewers felt the respondents understood how to complete the diaries. We understand that this group is self-selected, and those that might not have understood **how to** complete the diaries did not complete them.

Most interviewers received activity information directly from all members of the household. The few who did not felt that the respondent was reading from diaries.

interviewers felt that it was very important to clarify "what an activity is" and to stress the need for accurate address information in written materials to respondents and during the recruitment call. These two issues appeared to be the big "hold ups" during data retrieval.

Chapter 4- Data Collection Procedures

This chapter describes the process of data collection for the Triangle Travel Behavior Survey. Data collection was conducted from November 1994 to April 1995 (including two breaks due to holidays in November and December).

The Triangle Travel Behavior Survey was conducted in a five step process:

1.) Mailing listed sample study area households a letter about the survey;

2.) Recruiting study-area households by telephone to participate in the survey;

4.) Mailing each agreeing household a packet containing survey materials;

5.) Reminding households one day prior to their travel days to log their activities; and

6.) interviewing household members as soon after the second travel day with data collection effort

Advance Letter

All sample that had a listed telephone number (i.e. exists in a telephone bank) received a letter from the Triangle Transit Authority explaining the purpose of the survey and advising the household that a recruiter would becalling to invite them to participate in the Triangle Travel Behavior Survey. In Chapter 3, there was a demonstration of the positive **effect of** this advance letter of introduction on survey participation.

Recruitment

Households were recruited from a random probability sample of telephone exchanges within the study area, with the exception of the transit users enrichment sample. This transit enrichment sample and the results associated with it are detailed in Chapter 9. Three types of sample were used in this study: random listed, random unlisted, and transit user sample. Random sample of listed and unlisted telephone numbers comprised the largest portion. Random sample means that each household (with a telephone) that resided in a study area had an equal probability of being included in the sample frame. Sample design and stratification were discussed more fully in Chapter 2. Sample was generated in replicates, with each replicate representing **a** random "sweep" through the study area.

Each telephone number in a replicate was phoned with an initial attempt and five "callback" attempts for a total of six attempts. Attempts were varied by time of day in the event a household could not be contacted. At least one attempt was made on the weekend. The process provided a range of coverage to enhance the likelihood of reaching household with an especially active lifestyle or those households with members who work an evening shift. The recruitment interview was conducted using Computer-Assisted Telephone interviewing (CATI) technology. The CATI system technology delivers sample and records the disposition of each call attempt for the purpose of sample management.

Once contact was made, recruiters asked to speak to a head of the household. Following the initial recruitment script, interviewers invited the household to participate. Once the household spokesperson agreed, recruiters collected demographic information about the persons in the household and informed the respondent about the specified day for survey participation.

Recruiting was conducted from November 8, 1994 to March 19, 1995. There were two breaks for the Thanksgiving and Christmas holidays, from November 22, 1994 to November 28, 1994 and from December 16, 1994 to January 9, 1995 . Recruiting hours were 3:30pm to 8:OOpm (CST) on weekdays; 11:00am to 6:00pm (CST) on Saturdays, and 1:00pm to 6:00pm on Sundays (CST). Recruiting was conducted so that upon completion of the study, each set of activity days of the week would have approximately the same number of interviews. Recruiting was usually conducted nine days prior to the first designated travel day. This time frame provided sufficient amount of time for recruited households to receive their packet of survey materials.

Mail Survey Materials

After a household agreed to participate in the survey, the household was mailed a packet of survey materials. included in the materials were a letter from the Triangle Transit Authority explaining the purpose of the survey, a reminder sheet and magnet for refrigerator posting, a sheet of helpful hints, an activity/travel diary for each household member age 5 and older, and a household vehicle information form.

in the event that a household's survey packet was misdirected ordid not have a sufficient mailing address and was returned, NuStats rescheduled another travel date.

Reminder **Call**

The day prior to each household's first designated travel day, a NuStats interviewer contacted each household with a brief reminder about filling out their travel diaries and recording odometer readings. Approximately 65-70% of recruited households were actually contacted and reminded.

Interview Household Members

immediately following each household's second designated travel day, a NuStats interviewer contacted the household to collect the activity and travel information. Efforts to collect the data as soon as possible after the travel day were vigorous so as to ensure that the data was "fresh." in the event that a household could not be reached within a recall time period (usually **one** week), the household was rescheduled for another set of travel days.

The interview began by verifying household demographic data. Thereafter, the interviewer guided the respondent to provide his/her activities for the specified 48-hour period, using the diaries as a guide. Specially designed forms served as a structured guide for these interviews. Where possible and appropriate, the interviewer attempted to speak with other persons in the household and collect each individual's activity and travel information. in the event such reporting was not possible, the adult head of household spokesperson who had been initially recruited read from diaries or obtained information directly from the other household member. Approximately 30% of all interviews included such "proxy" interviews for one or more persons in the household. In less than five percent of all completed surveys, experienced interviewers asked respondents to reconstruct a set of days for which the household had not been actually scheduled, using the same degree of probing and attention to detail.

Experienced interviewers, thorough training and consistent monitoring over the course of the project served to ensure the success of this data collection effort. Interviewers asked probing questions, asking respondents for more detail and checking illogical responses such as a return trip taking much longer than the originating trip or fewer than two meats reported for a 24-hour period.

Of the 2,317 non-transit enrichment sample households who agreed, to participate in the survey, 1,778 completed the survey, a completion rate of 76.7%.

The day of week distributions for these completed households **is shown in** Table 17 below.

Table 17
Day of Week Distribution

Days of Week	Recruited Households n=2317	Completed Households n=1778
Sunday/Monday	15.0%	16.1%
Monday/Tuesday	16.5%	16.8%
Tuesday/Wednesday	13.8%	12.6%
Wednesday/Thursday	17.5%	16.3%
Thursday/Friday	20.4%	20.2%
Friday/Saturday	16.9%	17.9%

Response Rate

Sample design was discussed in Chapter 2. The sampling plan is but a means to an end. it is the response of the actual sample which matters. The responses of those who completed the survey comprised the data set, and an acceptable response rate is critical. Overall response rate is one guide to the representativeness of the sample respondents.

According to Council of American Survey Research Organizations, **response rate** is a summary measure and should be used to designate the ratio of the number of interviews to the number-of eligible units in the sample. It is defined in the following manner:

$$\text{Response Rate} = \frac{\text{Number of Completed Interviews with Eligible Reporting Units}}{\text{Number of Eligible Reporting Units in Sample}}$$

The Triangle Travel Behavior Survey used **a** two-stage sampling process (i.e., household recruitment and household retrieval). In this case, we report participation rates for recruitment and retrieval stages (independently) and then report a summary response rate (by **multiplying** the two rates). The response rate is calculated from the final sample dispositions.

These dispositions and the response rate calculations follow.

Table **18**

Final Sample Dispositions for Triangle **Travel Behavior Survey**

Dispositions	Frequency	Percent	Total Number and Percent
Eligible Sample			25.96%
Recruited	2,660	24.3%	
Second Refusal	118	1.1%	
Terminated in middle of interview	60	0.5%	
			2,838
Ineligible Sample			24.05%
Disconnected numbers/Number changed	1,902	17.4%	
Deaf/Language	213	1.9%	
Business/Government	455	4.2%	
Out of Area	60	0.5%	
			2,630
Eligibility Unknown Sample			49.99%
First Refusal	4,078	37.3%	
No answer	256	2.3%	
Busv	98	0.9%	
Answering Machines	569	5.2%	
Call backs	351	3.2%	
Head of Household not reached	113	1.0%	
			5,465
Total Sample Pieces	10,933	100.0%	

To calculate a response rate a disposition must be recorded for each sample piece, by attempting to determine eligibility for each element in the frame. Call attempts yielded three types of sample dispositions: (1) eligible; (2) ineligible and (3) unknown or not ascertained (see Table 18) above. in calculating the response rate, the "unknowns" (n=5,465) are distributed in the ratio of (1) to (2) to estimate the number of eligible units.

The recruitment rate is calculated using the following formula:

$$\text{Recruitment Rate} = \frac{\text{Number of Completed Interviews with Eligible Reporting Units}}{\text{Number of Eligible Reporting Units in Sample}}$$

Number of Recruited Households = 2,660

Number of Eligible Reporting Units = 2,660 + 178 + 2,836

Recruitment Rate = 2,660/5,674 = 47 percent

The completion rate is the rate at which recruited households complete the survey process. it is a measure **of** sample attrition, which influences sample bias. This rate is calculated by dividing the total number of completed surveys by the total number of recruited households. in the study, 2,045 households of 2,660 recruited, completed their surveys, for a completion rate of 77 percent.

Multiplying the recruitment rate by the completion rate, we arrive at 36 percent as the **overall response rate.**

Survey Validation

The objective of validation was to estimate the precision of the survey results and evaluate the reasonableness of the survey results. The precision **of** survey **results is discussed in** Chapter 2, Sample Design. The survey validation involved comparing regional population and housing characteristics with the 1990 Census data for reasonableness.

Table 19

Household Income

Income	Recruited Households* n=1894	Completed Households* n=1506	Census Data n=384,336
Less than $5,000	2.4%	1.7%	6.5%
$5,000-$9,999	2.6%	2.5%	7.7%
$10,000-$14,999	4.2%	4.2%	11.4%
$15,000-$19,999	6.0%	5.8%	8.6%
$20,000-$24,999	7.0%	6.9%	8.7%
$25,000-$29,999	8.5%	8.9%	12.9%
$30,000-$34,999	6.1%	6.3%	7.4%
$35,000-$39,999	7.1%	7.8%	3.1%
$40,000-$44,999	6.1%	6.3%	6.3%
$45,000-$49,999	5.4%	5.2%	5.5%
$50,000-$54,999	7.3%	7.2%	4.7%
$55,000-$59,999	6.1%	6.0%	3.8%
$60,000-$79,999	14.8%	14.2%	7.5%
$80,000-$99,999	7.2%	7.6%	5.1%
$100,000-$149,999	5.0%	5.2%	1.8%
$150,000 or more	4.2%	4.0%	0.8%

Excludes those who did not report household income.
Note: The Census data figure represents all households in all counties in the study area 1990 STF-3 files.

- **Almost one-fifth (18.3%) of the recruited households refused to divulge household income.**

- **Of the completed** households, 15.3% refused to **provide income information.**

TABLE 20

Including yourself, how many people are currently living In your household?

Household Size	Recruited Households n=2317	Completed Households n=1778	Census Data n=384,336
One	27.1%	29.0%	25.5%
Two	36.3%	37.2%	33.6%
Three	15.7%	15.1%	18.8%
Four	14.5%	13.4%	14.6%
Five	5.0%	4.0%	5.2%
Six or more	1.4%	1.3%	2.4%

TABLE 21

In what type of dwelling do you live?

Type of Dwelling	Recruited Households n = 2317	Completed Households n = 1778	Census Data n=384,213
Single Family Home	77.3%	77.6%	64.2%
Apartment	19.0%	19.1%	23.9%
Mobile Home	2.4%	2.5%	11.3%
Student Housing	0.2%	0.2%	NA
Other	0.7%	0.6%	0.7%

TABLE 22

Do you own, are you buying or do you rent your home?

Dwelling Status	Recruited Households n = 2317	Completed Households n =1786	Census Data n=384,213
Own/Buying	68.8%	69.9%	62.1%
Rent	30.4%	29.9%	37.9%
DK/Refuse	0.7%	0.2%	NA

TABLE 23

How many vehicles are available for use by you and other persons in your household?

Number of Vehicles	Recruited Households n = 2064	Completed Households n = 1778	Census Data n=384,213
None	2.8%	2.7%	8.3%
One	29.0%	30.5%	32.1%
Two	44.8%	45.3%	39.4%
Three	16.6%	16.1%	14.6%
Four	4.7%	3.9%	4.2%
Five or more	2.8%	1.5%	1.4%

TABLE 24

Age of Household Members

Age	Recruited n=5524	Completed n=4099	Census Data n=991,892
0-4 years	6.0%	6.1%	6.9%
5-9 years	7.5%	7.2%	6.3%
10-14 years	7.4%	6.9%	6.2%
15-19 years	4.8%	4.6%	7.3%
20-24 years	5.7%	5.4%	9.4%
25-34 years	18.6%	18.7%	19.8%
35-44 years	19.7%	19.7%	16.3%
45-54 years	13.9%	14.7%	10.3%
55-64 years	7.5%	8.0%	7.5%
65-74 years	5.5%	5.7%	5.9%
75 or older	2.3%	2.2%	4.0%
Refused	1.2%	1.0%	NA

Conclusions

The sample is a good representation of Research Triangle Region households in size and income. **There is** slight under-representation of households with household income less than $15,000 and a slight over-representation of households with income greater than $60,000. In addition, the sample slightly under-represents mobile home dwellers, renters and zero car households. **We** observed little sample attrition.

Chapter 5- Data Production Procedures

Data processing covers those survey tasks that occur subsequent to interviewing and prior to the presentation of survey findings. The function of data processing is to transform raw data from the survey into usable, reportable form. It includes address label production, editing, coding, entry, and tabulating.

- Address label production is the process by which home addresses are corrected for flaws such as incomplete entries or obvious misspellings and mailing labels are produced.
- Editing is the process by which raw survey data are corrected for flaws such as inconsistencies, time gaps or incomplete entries.
- Coding is the process by which raw data (after editing) are identified by response or analysis categories in preparation for tabulation.
- Entry is the process by which raw data are entered into a computerized data file format.
- Tabulation is the process by which coded data are counted in each response or analysis category and checked for consistency and non-response.

Each of these data production procedures is discussed in the following sections.

Address Label Generation and Mail-Out of Packages

The home address information for each household that agreed to participate in the study was reviewed the morning after data collection by a technical clerk to check for incomplete information and obvious misspellings. Each label contained the following information: Household Informant Name, Street Address, City, State, Zip, Sample Number, Household Size, and Cohort Number. The sample number was a unique number assigned to each telephone number (i.e., household) in the sampling frame. The household size indicated the number of persons in the household. The number was referenced when packaging to assure that there were enough activity diaries included for each household member. The cohort number referred to a household's assignment to a set of activity and travel days. Any problems spotted by the technical clerk were corrected directly in the recruitment data file, and address labels for each recruited household were produced.

Mailing packages were then prepared for each recruited household within two days of recruitment. Each package contained the following materials.

- Cover letter (on top)
- Household Verification Form (on yellow paper)
- Reminder Notice (on bright colored paper)
- Magnet (used to put reminder notice on refrigerator)
- Activity Diaries (one for each household member over age five)
- Instructions and example for filling out activity diary.

Quality control steps on the packaging included a review of the package contents by a research assistant assigned to the project team and tracking of returned packages. Returned packages were tracked by sample number. A list of returned sample numbers (along with associated names, phone numbers, and cohort numbers) was produced daily. This list was provided to the interviewing shift supervisor who ensured that the information was corrected, households' travel days were rescheduled, and a new package was sent.

Computer-assisted telephone interviewing for recruitment data eliminated the need **for** editing and entry of recruitment data. Thus, these next sections refer to retrieval data only.

Editing of Retrieval Data

In the process of editing, a review of respondent answers was made to reduce errors, inconsistencies, and incomplete responses in each questionnaire. The goal in the editing process was to do this while at the same time preserving the meaning and integrity of the collected data.

To achieve the above goals, each retrieval questionnaire was checked for:

- Omissions
- Logical consistency
- Coverage
- Legibility and/or clarity.

Omissions. The initial step in the editing process was to check each form to ensure that no data were omitted because of interviewer error or data unavailability. First, the data retrieval form was checked to see that interviewers completely filled out each section. Next, completeness of the vehicle information form was checked. All activities were checked for location information, including exact address, cross-streets, or a nearby landmark. Because of geo-coding requirements, postal route or P.O. Box numbers were not accepted in lieu of a street address. Address fields with postal route information were verified to ensure that an address could not be garnered.

Correction calls were made to retrieve "missing" information unless the information was deduced from elsewhere on the questionnaire. (e.g., if two household members went on the same trip, information for both was reviewed.)

Logical Consistency. It was possible that respondents may have reported conflicting information during the course of an interview. Since the interviewers were not always able to catch these inconsistencies while on the phone, the editors performed quick logic checks. Logic checks relevant to the project were:

- Cross-checking the information from the Vehicle Information Form against the Activity Diary Forms.
- Checking that the activity information seemed to correspond with the age level of the household member.
- Checking the logical flow of the activity and travel patterns for each day.
- Ensuring that travel information was reported for each change of activity location.
- Checking travel patterns and mode choice across all household members for consistency.

If the questionnaire failed these logic checks, the respondents **were** called back **for** corrections.

Checks for Coverage. Checks for coverage ensured that all relevant activities were reported. Assuming that a typical day was comprised of 12 to 18 hours of non-sleeping activities, a similar amount of activity time should have been reported. Editors reviewed surveys for big gaps in the day spent in "at home" activities. If the person was an adult, editors checked for work activities. If the person was a child, editors checked for school activities. The types of activities listed were reviewed to observe whether the interviewer appeared to have probed **for** at-home activities that could have involved travel like meals, shopping, banking, etc. (see diary). If a questionnaire failed these logic checks, the respondent was called back for corrections.

Checks for Legibility or Clarity. All entries (written or circled responses) were sufficiently legible and unambiguous to allow easy coding and keying. If anything was unclear, it was corrected by the editors.

Daily summaries of most prevalent mistakes by project and by interviewer were prepared by the data production staff manager and provided to research managers and the interviewing staff manager for action.

Activity Coding

The goal in a coding exercise was to develop a scheme whereby responses were objectively translated into a given set of categories. Most items in the retrieval questionnaire were precoded, thus eliminating variations due to individual coders. The coding scheme for the activity variable, which was not precoded, is presented in Figure 5 below. The activity codes basically represent trip destinations.

FIGURE 5

Activity Codes

01	Retail services (barber, beauty shop, shoe repair, dry cleaning)
02	Medical or health care (health center, doctor, clinic, dentist, hospital)
03	Professional services (lawyers, counselor, accountants)
04	Religious services (church, wedding, funeral)
05	Cultural activities (concerts, theater, lectures, museums, movies, clubs)
06	Sports activities (attending sports events)
07	Civic activities (political, community, association, other public meetings or activities)
08	Picking up/dropping off passengers
09	Going along for the ride to an activity
10	Driving for pleasure
11	Changing modes of transportation (includes walking if more than several blocks)
21	Shopping (clothing, food, household items, other)
22	Meals
23	Work (job or other employment related activities, business meetings)
24	School (attending classes, preschool or daycare, doing homework, research in library)
25	Household business (banking, paying bills, doing laundry)
26	Visiting with others (in person, in writing, on phone, by computer, social visits)
27	Amusements, Games (watching TV, movies, video games, hobbies)
28	Exercise, athletics
29	Watching TV or movies
40.	Home (childrearing, family conversations, resting, yardwork, reading, sleeping, housework, homework).

Sample checks of each coder's work were conducted by the data production staff manager to pinpoint deviations from the codebook and standardized scheme and to permit corrections as needed.

Data Entry and Tabulations

Data entry involved the transfer of information from questionnaires Into data processing form. Data entry is done within a computer-assisted environment. A customized data entry program was designed that conducted verifications, logical, and consistency checks at the point of entry. Elements of the "programmed" checks included:

- Inputting the sample number only once and person number, day number, and activity numbers automatically increment to decrease data entry errors.
- Only accepting values within the prescribed or preassigned range of response categories.
- Only "requesting" activity information for household members age 5 and older.
- Only allowing work related activities for employed household members.
- Only allowing licensed household members to be drivers on trips.
- Automated time checks
- Activity start time could not begin before last activity end
- No gaps greater than 30 minutes between activities
- Trips could not start before previous activity ended
- Trips could not end after next activity started.

When the program did not "accept" an entry, the data entry clerk verified and/or corrected information. In addition, a sample of each data entry clerk's work was verified by the data production staff manager.

Data tabulations or data checks of recruitment and retrieval data were done on a weekly basis to ensure that the data were consistent and accurate, and to monitor non-response.

Chapter 6- Geographic Coding Procedures

Parsons Brinckerhoff, Douglas & Quade ("Parsons") performed the geographic coding of all the address data (i.e. origins and destinations) using Geographic Data Technology's Matchmaker/2000 1.4 for Windows under subcontract to NuStats. An important preliminary step to geo-coding was address research and cleaning which is described below.

Address Research **and Cleaning**

Address research followed editing in a logical flow. The purpose of address research and cleaning was to prepare home, origin, and destination addresses for geo-coding. For each possible address record, either an exact address, cross-streets, or a near-by landmark should have been recorded.

Quality checks **were** done to ensure that a zip code was recorded **for each** address, to check spelling of streets and municipalities, to ensure that cross-streets actually intersected, and to determine an exact address for any business establishment for which a name and a street name were given.

The technical clerks used various tools to conduct such checks. These tools included:

- Criss-cross directories and telephone books
- Municipal and regional maps
- Transit guides and maps
- Lists of major employers and addresses
- Listing of cities in study area.

Address Cleaning was done subsequent to data entry and prior to geo-coding. The purpose of address cleaning was to enhance the address matching rate. First, the origin and destination information was sorted by city then by name so that all addresses in each city were grouped together. Data cleaners checked to ensure that city names and street names were spelled correctly and that street names, locations, and types were spelled consistently across records.

The "address type" variable guided how much address information there should be for each record.

- Exact Address = street number, street direction, street name, street type, apartment number, city, state, zip
- 0 Cross-streets = street direction 1, street name 1, street type I, street direction 2, street name 2, street type 2, city, state, zip (Smith St & Jones St)
- Landmark = some street information, city, state, zip.

Data cleaners checked and used tools (noted above for address researchers) to fill in missing information for address records. Checkers also ensured that the data files for geo-coding were flat, fixed field length files. The dBase Ill file specs were as follows:

Name field	50 characters
Address field	50 characters
City	20 characters
State	2 characters
Zip	5 characters

Address Matching Process

NuStats prepared address files for transmittal to Parsons by extracting the relevant and cleaned address information. The address files contained three different types of listed addresses

- Exact address listings, which included the unique sample number, person number, activity number, name of the place, street number, street name, city, and zip code.

- Intersecting streets listings, which included the unique sample number, person number, activity number, name of the place, first street name, second street name, city, and zip code, if known.

- Establishment location/landmark listings, which included the unique sample number, person number, activity number, name of the place, street name (if available) or significant physical landmarks (example - McDonald's near a specific Post Office), city name, and zip code.

NuStats delivered address files to Parsons on a regular basis throughout the course of the Triangle Travel Behavior Survey. These files were either dBase or flat, fixed field length ASCII files, formats that were compatible with the geo-coding software.

Parsons used Geographic Data Technology's Matchmaker/2000 1.4 for Windows. This software provides nationwide geo-coding capabilities for desktop mapping and Geographic Information Systems (GIS). Address files were matched to latitude/longitude coordinates, Census geography and ZIP- Code centroids.

Once the address files had gone through one iteration of the geo-coding software, Parsons distinguished between those address that had successfully been matched and those that had not. Parsons also performed editing of addresses to achieve a higher 'hit rate' with the matching software. Seventy to eighty percent of the addresses matched successfully with this process. Parsons transmitted these files to NuStats.

Appropriate coordinates were matched back into the activity and travel data files. Additional research on unmatched addresses relied on such tools as directory assistance, common destination address lists, database of major employers in the region, telephone directories, Cross Reference Directory for Greater Durham, Cross Reference Directory for Raleigh.

NuStats then retransmitted address files to Parsons. A second iteration of the matching software resulted in appropriate matches for approximately ninety percent (90%) of all origins and destinations. Those trip records which could not be assigned a latitude/longitude coordinate were given a code of '0000'. The trip records indicating a trip which either originated or ended outside of the study area were marked with a code for the county if in North Carolina or a state code if outside North Carolina.

Chapter 7- Survey Results

Survey findings are documented throughout this report. Interviewing results and sample dispositions are reported in Chapter 5. The findings in this chapter document some salient relationships among household characteristics, person characteristics, and trip characteristics. Trip characteristics are based on unweighted, unlinked data. Trip summaries are reported for all travel day pairs.

There were a total of 2,045 households participating in the survey, resulting in information for 6,247 persons (an average of 2.4 persons per household). Results in this chapter reflect 1,778 households from the random probability sample, representing 4,100 persons and an average of 2.4 persons per household. Data for transit enrichment sample households are excluded from this analysis but are the focus of analysis provided in Chapter 8.

Household Characteristics

A total of 1,778 households were surveyed. The distribution of completed surveys among household size and income matched the household distributions in the 1990 Census data, as seen in Survey Validation. Table 25 shows the number of surveys completed by household size and income, excluding those who did not report income.

Table 25

Household Size by Income, **Excluding Non-Responses**
n = 1,506

INCOME			HOUSEHOLD SIZE 1	2	3	>=4
Total Respondents		1506	437	538	232	299
	R	100.0	29.0	35.7	15.4	19.9
	C	100.0	100.0	100.0	100.0	100.0
<$10K		64	41	13	4	6
	R	100.0	64.1	20.3	6.3	9.4
	C	4.2	9.4	2.4	1.7	2.0
10-20K		150	88	41	13	8
	R	100.0	58.7	27.3	8.7	5.3
	C	10.0	20.1	7.6	5.6	2.7
20-30K		238	116	78	29	15
	R	100.0	48.7	32.8	12.2	6.3
	C	15.8	26.5	14.5	12.5	5.0
30-50K		386	122	138	55	71
	R	100.0	31.6	35.8	14.2	18.4
	C	25.6	27.9	25.7	23.7	23.7
>$50K		668	70	268	131	199
	R	100.0	10.5	40.1	19.6	29.8
	C	44.4	16.0	49.8	56.5	66.6

Most households surveyed had at least one vehicle available for personal use, while almost three percent did not. Table 26 summarizes the distribution of automobiles available by household size. The base of Table 26 is 1,778, the total number of completed households in the random sample. The number of vehicles available to a household is closely related to household size.

Table 26

Number of households by Size and Autos **Available**
n = 1,778 households

NUMBER OF VEHICLES			HOUSEHOLD SIZE			
			1	2	3	>=4
Totals		1778	515	661	269	333
	R	100.0	29.0	37.2	15.1	18.7
	C	100.0	100.0	100.0	100.0	100.0
0		48	32	9	3	4
	R	100.0	66.7	18.8	6.3	8.3
	C	2.7	6.2	1.4	1.1	1.2
1		542	398	98	29	17
	R	100.0	73.4	18.1	5.4	3.1
	C	30.5	77.3	14.8	10.8	5.1
2		806	61	415	131	199
	R	100.0	7.6	51.5	16.3	24.7
	C	45.3	11.8	62.8	48.7	59.8
>=3		382	24	139	106	113
	R	100.0	6.3	36.4	27.7	29.6
	C	21.5	4.7	21.0	39.4	33.9

Of the households that have at least one vehicle available for use, the majority have light duty gas cars (77 percent of the 3,044 total vehicles available for use). Twelve percent were light duty gas trucks. An extremely small percentage of vehicles were diesel fuel. Seven percent of the vehicles were coded as “other”, with the proliferation of vans, minivans and other sport utility vehicles accounting for most of this categorization.

Person Characteristics

As mentioned earlier, there were a total of 66,222 activities and 29,415 trips reported by 4,100 persons in the random sample dataset. Of these, 49% were male and 51% were female.

TABLE 27

Age of Household Members

Age	Recruited n=6,247	Completed n=4,100	Census Data n=991,892
under 15 years	23.2%	21.6%	19.4%
15-24 years	9.4%	8.6%	16.7%
25-44 years	38.2%	38.4%	36.1%
45-64 years	17.1%	22.6%	17.8%
65 or older	12.1%	8.8%	10.0%

TABLE 28

Activity distribution by strata
n = 1,778 households

	Urban	Suburban	Rural
Personal services	0.4%	0.7%	0.7%
Medical services	0.6%	0.9%	0.9%
Professional service	0.0%	0.0%	0.0%
Religious services	0.8%	1.6%	1.5%
Cultural activities	0.3%	0.3%	0.3%
Sports activities	0.5%	0.4%	0.4%
Civic activities	0.4%	0.8%	0.7%
Pickup Drop-off passenger	5.8%	7.6%	6.9%
Going along for the	0.1%	0.1%	0.2%
Going for a drive	0.0%	0.1%	0.1%
Changing modes of travel	0.6%	0.4%	0.7%
Shopping	12.2%	11.8%	10.5%
Meals	14.1%	14.0%	14.7%
Work	20.2%	16.7%	18.2%
School	6.6%	6.4%	7.1%
Household business	3.5%	3.6%	3.3%
Visiting with others	4.3%	4.3%	5.0%
Amusements	8.2%	7.9%	8.6%
Home	21.3%	22.4%	20.0%

Activity and Travel Characteristics

Activity and trip results were based on unweighted and unlinked data. There were **a** total **of** 66,222 activities and 29,415 person trips reported by 1,778 random sample households. The total number for al! 2,045 households was 79,363 activities and 34,755 person trips.

The 1778 random probability sample households had a mobility rate of 98 percent, with **only** 34 zero-trip households.

Table 29 summarizes the trip mode distributions for al! trips. **The** majority of the trips made by study area households (89 percent) were made by private vehicle, 5.3 percent by walking, and 3 percent by school bus. As shown below in Table 29.0g percent of a!! reported trips were made on public bus.

TABLE 29

Trip **Mode** Distribution **(Random Sample only)**
n = **1,778 households**

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
Private vehicle	1	26322	89.5	89.5	89.5
Public bus	2	275	.9	.9	90.4
Walk	3	1569	5.3	5.3	95.8
Bicycle	4	177	.6	.6	96.4
School bus	5	883	3.0	3.0	99.4
Other	6	189	.6	.6	100.0
	Total	29415	100.0	100.0	

Valid cases 29415 Missing cases 0

Table 30 presents the distribution of trip modes for the entire sample, including transit enrichment sample is included. The majority of the trips are still made in a private vehicle (86 percent), but 2.5 are made in public bus. This sample also includes more walk trips (6.8 percent).

TABLE 30

Trip Mode Distribution (Total Sample)
n = 2,045 households

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
Private vehicle	1	29883	86.0	86.0	86.0
Public bus	2	875	2.5	2.5	88.5
Walk	3	2356	6.8	6.8	95.3
Bicycle	4	235	.7	.7	96.0
School bus	5	1179	3.4	3.4	99.3
Other	6	227	.7	.7	100.0
	Total	34755	100.0	100.0	

Valid cases 34755 Missing cases 0

The survey asked respondents to report activities over the course of a forty-eight hour period that could or did involve travel. Table 31 shows the distribution of the 66,232 activities reported by the 1778 households. Excluding "home", the five most frequently reported activities were: meals, work, amusement, shopping, and school.

TABLE 31

Activity Distributionß
n = 1,778 households

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
Personal services	01	206	.3	.3	.3
Medical services	02	281	.4	.4	.7
Professional service	03	11	.0	.0	.8
Religious services	04	466	.7	.7	1.5
Cultural activities	05	106	.2	.2	1.6
Sports activities	06	115	.2	.2	1.8
Civic activities	07	233	.4	.4	2.1
Pickup Drop-off passenger	08	2123	3.2	3.2	5.3
Going along for the ride	09	43	.1	.1	5.4
Going for a drive	10	21	.0	.0	5.4
Changing modes of travel	11	157	.2	.2	5.7
Shopping	21	3460	5.2	5.2	10.9
Meals	22	15248	23.0	23.0	33.9
Work	23	6812	10.3	10.3	44.2
School	24	2890	4.4	4.4	48.6
Household business	25	1183	1.8	1.8	50.4
Visiting with others	26	1933	2.9	2.9	53.3
Amusements	27	6675	10.1	10.1	63.4
Home	40	24259	36.6	36.6	100.0
	Total	66222	100.0	100.0	

Valid cases 66222 Missing cases 0

Table 32 shows the distribution of completed households and the corresponding average activity and person trip rates by household income. There was an association between income and activity rate as well as income and trip rate.

TABLE 32

Average Person Trip Rate by Household Income

Household Income	Total Number of Households	Activity Rate (2 days)	Trip Rate (2 days)
Less than $5,000	26	30.38	14.58
$5,000-$9,999	38	22.29	14.95
$10,000-$14,999	63	22.25	14.31
$15,000-$19,999	87	30.46	17.93
$20,000-$24,999	104	27.71	18.80
$25,000-$29,999	134	30.23	17.30
$30,000-$34,999	95	31.97	19.11
$35,000-$39,999	118	35.05	22.15
$40,000-$44,999	95	37.66	23.04
$45,000-$49,999	78	42.29	24.82
$50,000-$54,999	109	42.20	30.64
$55,000-$59,999	91	46.38	27.42
$60,000-$79,999	214	44.77	27.74
$80,000-$99,999	115	46.19	28.84
$100,000-$149,999	79	49.03	24.16
$150,000 -$200,000	45	45.33	30.33
$200,000 or more	15	47.40	29.32
Refusals	272	34.77	23.48

Trip rates also varied by strata, as seen in Table 33. **A** one-way analysis of variance was run **to** test the significance of the association between land use (strata) and activity **and trip rates. The** value obtained for F(3.9) was significant at the .05 level, which leads **us to conclude that person** trip rates differ with respect to strata.

TABLE 33

Average Person Trip Rate by Strata

Stratum	Total Number of Households	Activity Rate (2 days)	Trip Rate (2 days)
Urban	261	31.21	21.83
Suburban	1081	37.23	23.08
Rural	436	40.50	25.54

Household size, however, appeared to have the strongest association with person trip rates, as shown in Table 34. The strength of the association was tested with a two-way analysis of variance in which the interaction of strata and household size is taken into account. The results of this analysis show that the stratum value for F (1.0) is not significant, while the household size value for F (131.9) is significant at the .OO1 level. A simple cross-tab of household size by stratum reveals an association between the two variables such that the urban strata tends to have households of smaller size than of the suburban or rural, which helps to explain the variance noted in person trip rates by stratum shown in Table 33.

TABLE 34

Average Person Trip Rate by Household Size

Household Size	Total Number of Households	Activity Rate (2 days)	Trip Rate (2 days)
1	515	17.79	11.42
2	661	34.02	22.10
3	269	46.33	28.82
4	238	62.01	39.33
5 or more	95	81.77	46.74

- Eighty-five (17.6%) of the recruited households refused to divulge **household income.**
- of **the** completed households, 15.5% had still refused to provide **income information**

TABLE 36

Number of Vehicles Available for Use by Households in Transit Sample

Number of Vehicles	Recruited Households n = 483	Completed Households n = 373	Census Data n=384,213
None	23.8%	23.9%	8.3%
One	38.5%	39.7%	32.1%
Two	21.3%	21.7%	39.4%
Three	11.4%	9.9%	14.6%
Four	4.1%	4.3%	4.2%
Five or more	1.0%	0.6%	1.4%

TABLE 37

Household Size in Transit Sample

Household Size	Recruited Households n=483	Completed Households n=373	Census Data n=384,336
One	35.0%	39.9%	25.5%
Two	34.4%	33.5%	33.6%
Three	14.9%	14.5%	18.8%
Four	10.1%	8.3%	14.6%
Five	3.1%	1.9%	5.2%
Six	2.1%	1.9%	2.4%
Seven	0.4%	0.0%	0.0%

TABLE 38

Age of Household Members in Transit Sample

Age	Recruited n=1,046	Completed n=895	Census Data n=991,892
0-4 years	4.6%	3.5%	6.9%
5-9 years	6.4%	4.7%	6.3%
10-14 years	4.2%	3.7%	6.2%
15-19 years	14.3%	14.3%	7.3%
20-24 years	30.7%	32.9%	9.4%
25-34 years	16.8%	18.2%	19.8%
35-44 years	8.2%	8.4%	16.3%
45-54 years	5.4%	4.9%	10.3%
55-64 years	4.7%	4.9%	7.5%
65-74 years	2.4%	2.2%	5.9%
75 or older	1.9%	1.8%	4.0%
Refused	0.4%	0.4%	NA

TABLE 39

Employment Status for Transit Sample Household Members Age 16 and Older

Employment Status	Recruited Households n = 720	Completed Households n=510
Employed full-time (>30 hours/week)	24.0%	23.7%
Employed part-time (<30 hours/week)	19.0%	21.0%
Self-employed full-time	1.5%	1.6%
Self-employed part-time	1.7%	1.2%
Retired	5.1%	6.1%
Full-time homemaker	1.3%	1.4%
Not employed	47.4%	45.0%
Don't know/Refused	0.0%	0.0%

Survey results from transit sample

The 373 households that completed the survey, represented a total of 895 persons (an average of 2.4 persons per household). The transit sample had a mobility rate of 99.5 percent with only two zero-trip households.

For the two-day survey period the mean number of total activities was 34.87. The mean number of activities for Day 1 was 17.61, and 17.26 for Day 2. The mean number of person trips for Day 1 was 13.63, and 13.38 for Day 2.

Table summarizes the trip mode distributions for trips taken during the 2-day travel diary period by transit sample respondents. The majority of the trips made by study area households (60 percent), were made by private vehicle. Fourteen percent were made by public bus, and 18 percent walked.

TABLE 40

Trip Mode Distribution
n = 337 households
n = 5381 trips

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
Private vehicle	1	3245	60.3	60.3	60.3
Public Bus	2	753	14.0	14.0	74.3
Walk	3	967	18.0	18.0	92.3
Bicycle	4	78	1.4	1.4	93.7
School Bus	5	285	5.3	5.3	99.0
Other	6	53	1.0	1.0	100.0
		5381	100.0	100.0	
Valid cases 5381	Missing cases 0				