

Atlanta Regional Commission

***2001 Atlanta Household
Travel Survey***

Final Report

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NuStats

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INTRODUCTION

This report documents the design, implementation, and results of the Atlanta Household Travel Survey, conducted by NuStats from April 2001 through April 2002. The study was conducted on behalf of the Atlanta Regional Commission (ARC).

The objective of the household travel survey is to collect information on work and non-work travel behavior. This includes trip generation, trip distribution, and modal choice. This study is an essential element in the transportation planning and modeling efforts for the 13 county Atlanta Region. The study objective was to produce data that could be used to develop and calibrate travel demand models for use in travel forecasting, land use planning, and air quality planning. The resultant data set is adequate to fulfill the models' functions of estimating trip generation and distribution, mode choice, and assignments. The data set will serve as the foundation for an entirely new generation of travel demand models.

Background

The Atlanta Household Travel Survey sampled 8,069 households in the thirteen county non-attainment area. This geographic area is depicted in Figure 1-1. Like all recent household travel surveys, the Atlanta Household Travel Survey relied on the willingness of area residents to complete diary records of all travel for a 48-hour period. Households were randomly selected to participate in the study via Computer Assisted Telephone Interview (CATI). Household recruitment for the study was conducted through the use of a "recruitment interview", in which respondents were informed of the survey, its purpose, and the obligation of all household members to complete the survey. Data on the household and household members were also collected during the recruitment interview. Participating households were assigned a specific "travel period" or 48-hour period on which to record their travel and activities. This travel day pair typically took place 7 to 10 days after the recruitment interview. Collection of the travel information was done through the use of a CATI based "retrieval interview."

Survey Purpose and Coverage

Household travel surveys are used to obtain information about work and non-work travel behavior. This includes trip generation, trip distribution, and modal choice data as well as data on transit use, neighborhood preferences, health and activity. Updated household travel information can be used for modeling purposes as well as transportation planning projects, land use planning, and air quality planning efforts.

A total of 12,184 households were recruited to participate in the study. Of these, 8,069 households (66%) completed travel¹. The 8,069 households, weighted, represent 21,323 persons, 14,449 vehicles, and 126,127 places visited during the 48-hour travel period.

¹ 289 households were ineligible to complete the household travel survey at the retrieval stage (due to moving or disconnected phone). Hence, 11,895 households were eligible to complete the retrieval interview.

**Figure 1-1
Study Area Geography**



The population of interest for the study was all households residing in the 13 county Atlanta Region. The distribution of participating households at the county level is shown in Table 1-1.

**Table 1-1
Geographic Distribution of Households**

County	Retrieved	%
Cherokee	133	1.6%
Clayton	286	3.5%
Cobb	1,536	19.0%
Coweta	140	1.7%
DeKalb	2,224	27.6%
Douglas	60	0.7%
Fayette	84	1.0%
Forsyth	86	1.1%
Fulton	1,975	24.5%
Gwinnett	1,048	13.0%
Henry	308	3.8%
Paulding	55	0.7%
Rockdale	134	1.7%
Total	8,069	100.0%

All retrieved households, unweighted.

Contents of the Report

The purpose of this report is to document the methods used to conduct the Atlanta Household Travel Survey, as well as to present survey results. It is organized into chapters by major topics. In addition to this Introduction, the chapters include:

- Survey Methods,
- Weighting and Expansion, and
- Survey Results.

The Survey Methods chapter presents the methods used to conduct the survey. Essentially, the six main phases of data collection are presented and evaluated, along with the quality control guidelines established for use in the study. The phases include sample design, advance notification, recruitment, travel data retrieval, data processing, and geocoding.

The Weighting and Expansion chapter documents the processes used to weight and expand the data.

The final section is the Data Summary. This chapter provided data summaries from the household, person, vehicle and trip files.



SURVEY METHODS

The purpose of this chapter is to summarize the methods used to conduct the Atlanta Household Travel Survey. This survey was a multi-stage study, as it involved up to two telephone interviews, one mailing to the households, and a web retrieval option. Prior to the start of data collection, a pilot test was conducted. The pilot test objectives were to refine the survey materials and to fine-tune the processes and programs that were used to carry out the travel behavior study.

Pilot Test

During the month of March 2001, NuStats conducted a pilot test of procedures and instruments designed for use as part of the Atlanta Household Travel Survey. The objectives of the pilot test were (1) to conduct a “dress rehearsal” of all procedures and instruments designed for use in the full study and (2) to debrief respondents about their participation experience and reactions to materials. Specific areas of assessment included:

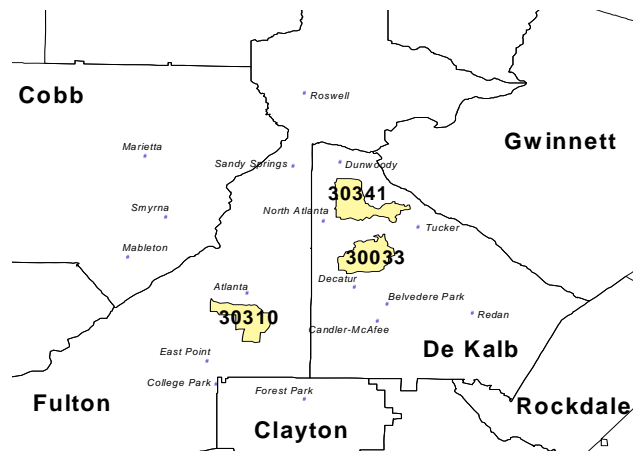
- Examination of all stages of data flow procedures and the quality assurance process.
- Evaluation of respondent reaction to the survey process and exploration of local levels of respondent cooperation and response rates.
- Assessment of project staff training and performance.

Throughout all pilot activities, the goals were to target areas for improvement prior to the start of the full study. The role of the pretest was a critical one in the study – it was not designed to “make everyone comfortable,” as that approach would result in inadequate and insufficient evaluation of the process. It is referred to as a “dress rehearsal” specifically for this reason – it was a road test of all systems to ensure everything is in place and ready for full-study implementation. As such, the pretest households did not count toward the required completed households for the actual survey.

The pilot test consisted of all activities required to produce a data set containing travel behavior for all members of the surveyed households. This included sample generation, recruitment, placement of respondent materials, reminder calls, retrieval, geocoding, quality assurance, and data delivery. The pilot focused on three specific zip codes: the city of Atlanta (30310), Decatur (30033) and Marietta (30341). These regions were selected because they represent lower income households with a higher propensity to use transit (30310), middle class households in a walkable downtown environment (30033), and higher Hispanic populations (30341). The location of the pretest areas with respect to the entire Atlanta Household Survey region is shown in Figure 2-1.

Households were assigned three different sets of travel days: 3/14 and 3/15 (Wednesday and Thursday); 3/15 and 3/16 (Thursday and Friday); and 3/16 and 3/17 (Friday and Saturday). The last set of travel days were added to allow for additional subcomponent recruitment.

**Figure 2-1
Geographic Location of Pretest Areas**



A total of 74 households were recruited with diary data collected from a total of 53 households. The retrieval rate was 72 percent, which was the number of completed households divided by the number of recruited households. Complete documentation of the pilot test results are summarized in Working Paper #3. The data collection procedures used in the full study reflected changes based on the pilot test findings.

The survey processes used in the full study included: (1) sample design and performance, (2) advance notification, (3) recruitment and respondent packet mailing, (4) reminder calls and retrieval, (5) data processing, (6) geocoding, and (7) quality control. The purpose of this chapter is to describe each stage as well as evaluate how well that procedure worked.

Main Study

Sample Design

The sample for the Atlanta Household Travel Survey is intended to optimize the production of data with sufficient observations for all relevant levels in three variables: net residential density level (NRDL), household size, and household income. The survey employed a list assisted random digit dial design with a probability sample selection process that selected households for inclusion in the study. The major requirement for probability samples was that the relative probability (or chance) of any given household in the universe being included in the sample was known. Once the sampling procedure was determined, the selection of specific households for inclusion in the sample was left entirely to chance. The sample included both listed and unlisted households. The definition of a completed household was one in which travel and activity data were collected from *all* household members age five and older. A total of 8,069 households met this criterion.

The type of probability sampling employed was stratified sampling in which the sample goal was to have 20 percent of the sample in each of the five preset nrld categories. Current income data was unknown at the time of the study and the relationship between nrld and household size was

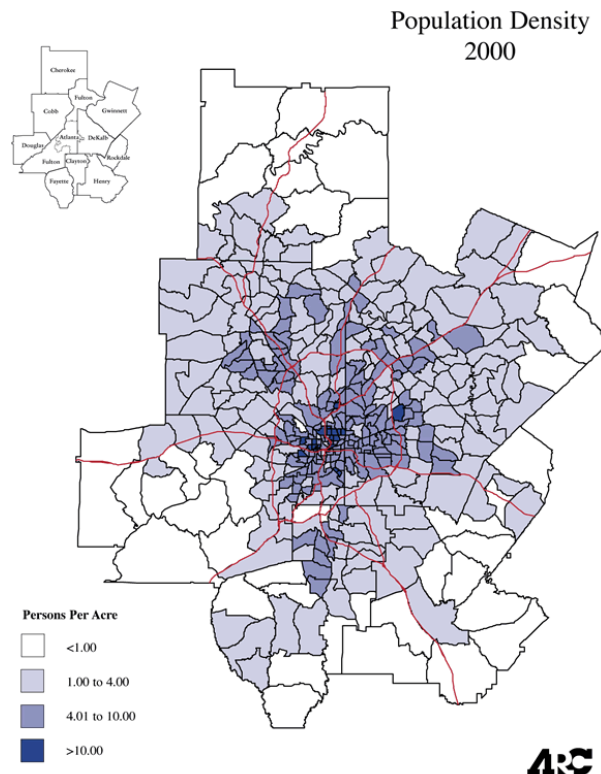
unknown, hence these two variables were not used to stratify the sample. The sample and completed household distribution for the NRDL variable is shown in Table 2-1.

Table 2-1
Comparison of Sample Goals and Actual Responses by Net Residential Density Level

NRDL	Population Percent	Sample Percent	Retrieved	Retrieval Percent
0.00-<2.00du/acre	53.0%	38.4%	3,099	38.4%
2.00-<4.00 du/acre	28.9%	25.2%	2,036	25.2%
4.00-<6.00 du/acre	8.8%	14.9%	1,200	14.9%
6.00-<8.00 du/acre	4.6%	10.3%	833	10.3%
8.00+ du/acre	4.6%	11.2%	901	11.2%
Total	100.0%	100.0%	8,069	100.0%

The nrld stratification does provide a robust oversample of high-density areas. The actual population density distribution is shown in Figure 2-2. The highest densities of persons per acre are found in a very small percentage of the total study area. Hence, the net residential density stratification concentrated a disproportionate percentage of the sample in small geographic areas.

Figure 2-2
Actual Population Density in the 13 County Study Area



Overall sample goals for the Atlanta Household Travel Survey include the following:

- Inclusion of high density areas
- County level representation
- Low income representation
- Minority representation

The inclusion of high-density areas is an important sample design element because it provides high-density samples for land use and neighborhood planning analysis that is an important component of the study. Equitable county level representation is critical for the regional transportation planning conducted by ARC. It is often difficult to gain participation from low income and minority households. Important land use and transportation planning decisions impact all residents of the Atlanta region; hence ensuring participation of all population groups was an ARC priority.

Sample Design Adjustments

The sample performance with respect to these four sample goals was continuously monitored throughout the study. As phase 1 and 2 of the study progressed, three additional sample design elements were incorporated into the overall sample design. These include (1) High density oversample; (2) County oversample, and (3) Environmental justice outreach effort.

High Density Oversample

Finding enough samples in the 13 county Atlanta region that fulfilled the sample requirements for households in areas with nrld of 6.00 du/acre or more was quite a challenge. A special oversample of these high-density areas was drawn in an attempt to maximize the amount of samples eligible to participate in these high-density areas. A total of 11,944 additional sample cases were generated. Of these, 49.1 percent were in areas with nrld greater than 6.00 du/acre.

County Oversample

The full impact of the nrld stratification on household demographic variables such as household size, residence type, household ownership, household income, and race is unknown at this time. However, early on it was apparent that the county level coverage was adversely impacted by the nrld stratification. To alleviate this impact, and ensure proportional regional coverage an additional county oversample was drawn and fielded in the fall of 2001. A total of 18,919 additional county oversamples were drawn. This oversample resulted in a total of 2,390 recruited households and 1,723 completed households.

Environmental Justice Outreach

Following the pretest and phase one of the study, there was evidence that ensuring inclusion of low income and minority households in the study warranted a third sample strategy. For this third sample strategy, nine separate EJ community samples were drawn and data collection was coordinated with community based outreach and communication led by GA Tech. The sample size for each of these areas is shown in Table 2-2.

**Table 2-2
Geographic Location of EJ Oversample**

Census Designated Place	Sample Size	Sample Percent
Old Fourth Ward	2,608	19.3%
Peoplestown	638	4.7%
Reynoldstown	3640	27.0%
Mechanicsville	238	1.8%
Lynwood Park	2465	18.3%
McDonough	1499	11.1%
Beaver Ruin Road	687	5.1%
Roosevelt Circle	694	5.1%
Chamblee	1027	7.6%
Total	13,496	100.0%

Response Rates

Household Response Rates. In addition to having sufficient sample sizes for modeling, it is also important to understand the level of effort required to attract, retain and obtain travel data from households in the study area. The response rate calculation is the best measure of this level of effort, as it indicates how many households must be recruited in order to obtain a completed household.

The response rate is the ratio between completed interviews and total eligible sample called on the telephone. The response rate is calculated for recruitment, then retrieval. The overall response rate is determined by multiplying the two resultant rates. The recruitment rate for this study was 44.8 percent, the retrieval rate 67.8 percent and the overall response rate for the study was 30.4 percent. In other words, 30.4 percent of all eligible households that were contacted actually completed the survey. This is comparable to those achieved in similar studies conducted across the US in recent years. Given the events of September 11, 2001 that occurred during the course of data collection for this study, the fact that the overall response rate is comparable indicates that the study area respondents understood the importance of the study and participated, despite national events.

**Table 2-3
Comparison of Household Response Rates
Among Other Metropolitan Areas**

Survey	Type	Rate
Atlanta Household Travel Survey	2-day	30%
2000 Maricopa Regional Study	2-day	31%
2000 Philadelphia/South Jersey	1-day	33%
1997/98 Metropolitan NY/NJ/CT	1-day	34%
1999 Seattle	2-day	32%

Identification of Non-Response Bias. As with any survey, the issue of non-response bias is important and must be addressed. Non-response bias in a survey data set occurs when certain individuals from the study universe do not participate in the survey. In order to determine if non-response bias is an issue in the Atlanta Household Travel Survey, respondent provided data was compared to 1990 and 2000 Census data for the region to determine if specific sub-groups of the population were not included in the data set.

The goal was to have adequate representation from the study area population as a whole. With an overall response rate of 30.4 percent, it is evident that a portion of eligible households did not participate in the study. In order to determine who did not participate in the survey, those questions, demographic data for the 8,069 households that completed the survey is compared to 1990 and 2000 Census data. This comparison is shown in Tables 2-4 through 2-7.

As shown in those tables, the demographics of the households participating in the study tracked the Census data fairly well.

Household Vehicles: Zero vehicle households typically represent a demographic group that is historically underrepresented in survey data. According to the latest Census information, 7.4 percent of households in the Atlanta region did not have a vehicle available for use. The Atlanta Household Travel Survey data included 427, or 5.3 percent, zero vehicle households.

Household Size: The oversampling of high-density households and the overall level of effort required to complete the study resulted in an over-sample of 1 and 2-person households (6.1 and 10.7 percentage points above 2000 Census data respectively). Three person households are slightly below target (3.3 points below 2000 Census data). There are lower numbers of four- and more than five-person households represented in the sample estimates. Many of these households only partially completed the study. The criterion for inclusion in the final data set is that travel information is collected for all members of the household. Certainly, this criterion has a positive impact on overall data quality and completeness. However it does have a disproportionate impact on larger size households.

Household Income: The household income distribution is very consistent with 2000 Census data. There is a slight oversample of households with incomes of \$50-\$75,000 annually.

Geography: It is evident when looking at the county level distribution that the county oversample that was included in the sample design had a significant impact. With the exception of the sizable oversample in DeKalb County, the county distribution tracks very well with the latest Census information.

Table 2-4
Comparison of Survey and Census Household Distributions by Vehicle Availability

Household Vehicles	Survey Households	2000 Census Data	Point Difference
0	5.3%	7.4%	-2.1%
1	31.0%	32.3%	-1.3%
2	43.4%	41.6%	+1.8%
3+	20.2%	18.7%	+1.5%
Total	100%	100%	

Source: 2000 Census data, Bureau of the Census.

Table 2-5
Comparison of Survey and Census Household Distributions by Household Size

Household Size	Survey Households	2000 Census Data	Point Difference
1	29.9%	23.8%	+6.1%
2	41.7%	31%	+10.7%
3	14.6%	17.9%	-3.3%
4+	13.8%	27.3%	-13.5%
Total	100%	100%	

Source: 2000 Census data, Bureau of the Census

Table 2-6
Comparison of Survey and Census Household Distributions by Household Income

Household Income	Survey Households	2000 Estimate	Point Difference
< \$10,000 to <\$20,000	11.6%	14.4%	-2.8%
\$20,000 to < \$50,000	31.2%	32.1%	+0.1%
\$50,000 to <\$75,000	28.0%	21.7%	+6.3%
\$75,000 +	29.1%	31.7%	-2.6%
Total	100%	100%	

Source: 2000 estimates for ARC 13 county area as reported on Georgia 2000.

Table 2-7
Comparison of Survey and Census Household Distributions by County

County	Survey Households	2000 Census Data	Point Difference
Cherokee	1.6%	3.7%	-2.1%
Clayton	3.5%	6.1%	-2.6%
Cobb	19.0%	16.8%	+2.2%
Coweta	1.7%	2.3%	-0.6%
DeKalb	27.6%	18.4%	+9.2%
Douglas	0.7%	2.4%	-1.7%
Fayette	1.0%	2.3%	-1.3%
Forsyth	1.1%	2.5%	-1.4%
Fulton	24.5%	23.7%	+0.8%
Gwinnett	13.0%	14.9%	-1.9%
Henry	3.8%	3.1%	+0.7%
Paulding	0.7%	2.1%	-1.4%
Rockdale	1.7%	1.8%	-0.1%
Total	100%	100%	

Survey Process

Stage 1: Advance Notification

All households for whom addresses were available at the time of sampling (i.e., the address was listed in the sampling frame) were mailed an advance letter and brochure. The advance letter served to introduce the household to the Atlanta Household Travel Survey. It was personalized to the household and printed on ARC letterhead. The purpose of the brochure was to provide detailed information about the survey, to explain what participation would entail and to provide answers to commonly asked questions. The project website was also referenced, if additional information was required.

A total of 111,100 advance letters were mailed to sampled households for whom a name and address were available in the sampling frame. For those households where only a telephone number was available (i.e., unlisted telephone number), there was no advance notification.

Stage 2: Recruitment and Respondent Packet Mailing

Approximately five to seven days after the advance letters were mailed, the first recruitment attempts were made. The purpose of the recruitment interview was to secure participation from the household and to collect baseline demographics for the household and its members, vehicle information and work or school addresses. The interview was conducted using computer-aided telephone interviewing (CATI) technology. The day following recruitment, personalized diaries were prepared for each household and mailed.

The recruitment calls began in April 2001 and continued through March 2002, allowing for breaks during the summer months and Thanksgiving and Christmas holidays. Over the course of the recruitment effort, 176,348 telephone numbers were called. Of these:

- 39,336 (22%) resulted in contact with eligible households.
- 62,612 (36%) were determined to be ineligible (non-working, non-household or non-voice lines), and
- 74,370 (42%) were unable to be classified as eligible or ineligible after 12 call attempts.

Of the eligible households reached, 12,184 of the 39,336 agreed to participate in the study (44.8 percent). The average length of the recruitment call was 17.1 minutes.

It is important to note that the amount of sample used in this study was higher than normal, given the extremely high rate of over-sampling of NRDL, outlying counties, and EJ communities.

Stage 3: Reminder Calls and Retrieval

The reminder calls were made to all recruited households the night prior to their assigned travel days. The purpose of the reminder call was to confirm that each household had received its packet and to answer any last minute questions the household might have. Data retrieval began the day following the travel day or on the appointed day and time (as requested by the respondent).

The retrieval calls began in April 2001 and continued through April 2002, allowing for breaks during the summer months and Thanksgiving and Christmas holidays. Over the course of the retrieval effort, all 12,184 recruited households were called. Of these, 11,895 were still eligible to complete the study and 8,069 (68 percent) resulted in completed household interviews. The average length of the retrieval call was 25.4 minutes per household.

Distribution of Travel Days

As households were recruited, they were asked to keep track of their travel for a specific 48-hour period of time. The goal was to have a larger proportion of the sample with a Monday-Friday assignment. A Total of 5,691 households (70.5 percent) completed a weekday only travel period. The remaining 2,378 households (29.5 percent) completed either a Sunday/Monday travel pair or a Friday/Saturday travel pair. This is slightly higher than the original retrieval goal of 26 percent.

Table 2-8
Distribution of Households by Day of Week

Travel Day Pair	Frequency	Percent
Sunday/Monday	1,162	14.4%
Monday/Tuesday	1,561	19.3%
Tuesday/Wednesday	1,390	17.2%
Wednesday/Thursday	1,323	16.4%
Thursday/Friday	1,417	17.6%
Friday/Saturday	1,216	15.1%

Base: All households, unweighted.



DATA PROCESSES

The data collected through the recruitment and retrieval interviews were processed daily using NuStats' Continuous Data Flow (CDF) system. The CDF system served as the pipeline, channeling data from one stage to the next in a continuous fashion, preventing data progression if stage criteria were not met without impeding the overall flow of data. The CDF system used in this project had 14 stages.

The following table documents the continuous data flow stages from sample generation to timely data delivery. The progression criteria are stated in the third column. Two types of reports were used to monitor progress: production reports showed movement of the data (how many interviews completed previous night, geocoding progress, etc.); exception reports showed lack of movement – how many recruited households could not geocode and therefore were not mailed a packet? Tracking both progression and exceptions was critical to successful completion of the project.

**Table 3-1
NuStats' Continuous Data Flow Progression**

Stage	Stage Description	Progression Criteria
1	Sample Generation	None
2	Geocode Home Addresses	<ul style="list-style-type: none"> • Geocoded addresses go to Stage 3 • Ungeocoded listed addresses and unlisted addresses go to Stage 4
3	Advance Mailing – Introductory letter is mailed to sampled households electing this option	<ul style="list-style-type: none"> • All sample progresses to Stage 4.
4	Recruitment Interview – Sampled households are contacted to secure participation in the study. Those who agree to participate provide demographic data and are assigned travel days	<ul style="list-style-type: none"> • If the interview is completed, goes to Stage 5 • If the interview is not completed, exception report is generated • If interview is not attempted, sample status is updated and sample is scheduled for callback.
5	Geocode Habitual Addresses – work and school addresses are geocoded	<ul style="list-style-type: none"> • If address geocodes, goes to Stage 6 • If address does not geocode, exception report generated and also proceeds to Stage 6 but flagged.
6	Diary Placement – A personalized diary packet is prepared and mailed to each recruited household	<ul style="list-style-type: none"> • If packet is mailed, goes to Stage 7 • If packet is not mailed, exception report generated to indicate reason
7	Reminder Call – Recruited households are contacted to confirm receipt of diary packet and remind about upcoming travel days	<ul style="list-style-type: none"> • If household is ready, goes to Stage 10 • If household needs new packet, goes to Stage 6 • If household is rescheduled, can go to Stage 6 or 10 • If household refuses, exception report is generated and assigned to interviewer specializing in refusals
8/9	Travel Days – Household members record travel on assigned days	
10	Retrieval Interview – The first retrieval call is placed the day following travel or at a respondent-designated time	<ul style="list-style-type: none"> • If household provides data according to definition of “complete”, goes to Stage 11 • If household did not record travel data and is rescheduled, can go to Stage 7 or 9 • If household refuses, exception report is generated and assigned to interviewer specializing in refusals
11	Field Edits – the night the retrieval interview is completed, work is checked for completeness	<ul style="list-style-type: none"> • If work meets standards, goes to Stage 12 • If work does not meet standards household is assigned for callback/verification
12	Data Processing – at the conclusion of each data collection shift, all data are processed and prepared for edit check and geocoding	<ul style="list-style-type: none"> • If processed data meets completeness standards, goes to Stage 13 • If processed data does not meet completeness standards, exception report is generated and household is assigned for correction / callback
13	Geocoding of Trip Ends – all new address information (new or updates to previously collected information) is geocoded through both batch and interactive processes	<ul style="list-style-type: none"> • If geocoded, goes to Stage 14 • If not geocoded, exception report is generated and household assigned for correction/callback • Daily reports monitoring hit rates
14	Data Quality Checks – all data is subjected to visual inspection and edit check program to ensure quality standards and data specifications are met	<ul style="list-style-type: none"> • If passes, goes to Stage 15 • If fails, exception report is generated and household assigned for correction/callback • Daily reports monitoring pass rates
	Process complete – data ready for delivery	<ul style="list-style-type: none"> • If process complete, data flagged for delivery and process ends • If process not complete and time thresholds crossed, exception report is produced and data specialist addresses household to ensure data movement

Geocoding

The term “geocoding” defined the process of evaluating address information with the goal of assigning an exact latitude and longitude. This process took place throughout the course of the project, beginning with the home addresses, continuing with habitual addresses (work and school locations), and also including the trip ends (non-home and non-habitual locations) collected during the retrieval stage of the project.

Using ArcView software, all home, work, school and trip locations reported were subjected to the geocoding task, using coverage files provided by ARC. At the conclusion of the project, 64,617 addresses comprised the “location” file for the 8,069 households that completed the study. Of these, 93% were successfully matched to latitude/longitude coordinates. The distribution of addresses by type and geocoding status is shown in Table 3-2.

Table 3-2
Address Geocoding Outcomes

Address Type	Matched	Unmatched	% Matched	Out of Area
Home	8,069	0	100%	
Habitual (work & school)	12,403	1,819	87%	356
Other Locations	37,509	2,618	93%	1843
Total	57,337	4,437	93%	

Quality Assurance

The data that summarizes the demographic and travel behavior characteristics of the 8,069 households was subjected to both manual and electronic quality checks. These checks reviewed the data for conformity to variable requirements, logistical consistency and quality standards. The checks included:

- a. Across all files
 - Range of values for each data item is valid, including values for non-response (i.e., responses cannot be outside range)
- b. Household file
 - Compare household size in household file with number of person records in person file for each household.
 - Compare household vehicles in household file with number of vehicle records in vehicle file for each household.
 - Sum number of places and trips in trip file for each household, by each travel day as well as for the 48-hour travel period.
- c. Person file
 - Verify that the number of places recorded for each person is at least as many as the number of places the respondent indicated visiting at the start of the retrieval interview.
 - Verify that if employed, respondent went to work on travel day or provided reason for not.
 - Verify that if a student, respondent went to school on travel day or provided reason for not.
- d. Vehicle file
 - Verify vehicle year if older than 1960.

- Re-contact household if vehicle make and model were not reported.

e. Trip file

- Verify that each household member has at least one place record.
- Verify that household and person records exist for each sample number in the trip file.
- Verify that travel times are consistent and logical: (1) arrival at place N is prior to departure from place N; (2) arrival at place N+1 is after departure from place N.
- Re-contact household if extreme trip durations and/or activity durations.
- Verify that all household members returned home at end of travel day or last reported location plausible.
- Verify that travel data exists for all places except Place 1.
- Verify that reported activities are consistent with the reported locations.

Any discrepancies were flagged for research, corrections and/or verification.

WEIGHTING AND EXPANSION

The Atlanta Household Travel Survey resulted in the creation of a data set that contains the demographic and travel behavior characteristics of 8,069 households in the Atlanta region. The 8,069 Atlanta households, when weighted, have 21,323 persons, 14,449 vehicles, and made 126,127 trips made over the 48-hour travel periods. When expanded, the data represent the 1,355,990 households in the 13 county ARC region. The purpose of this chapter is to document the procedures for weighting and expanding the data.

Weight Calculations

The Atlanta Household Travel Survey utilizes both weighting and expansion factors to 1) adjust the sample data to match population parameters and 2) expand trip information to all households in the survey area. This includes the Counties of Cherokee, Clayton, Cobb, Coweta, Dekalb, Douglas, Fayette, Forsyth, Fulton, Gwinnett, Henry, Paulding, and Rockdale.

This section illustrates the methodology selected in creating sampling and expansion weighting for the Atlanta Household Travel Study. The variables used in the weighting process include (followed by categories):

- NRDL (Net Residential Density Level): 0-<2, 2-<4, 4-<6, 6-<8, 8+
- County (the proportion of each county's population to the total survey area population)
- Household Income:
 - Less than \$10K, \$10K-\$19.9K, \$20K-\$29.9K, \$30K-\$39.9K, \$40K-49.9K, \$50K-\$59.9K, \$60K-\$74.9K, \$75K-\$99.9K, \$100K or More
- Household Size
 - One Person, Two Persons, Three Persons, Four Persons, Five or More Persons
- Race/Ethnicity
 - Race or Ethnicity of the respondent was used as a proxy for the household. Collapsed cells were used in this case - Black/Non-black and Hispanic/Non-Hispanic
- Household Vehicle Ownership

- Zero Vehicles, One Vehicle, Two Vehicles, Three Vehicles, Four Vehicles and Five or More Vehicles

In order to create weights for each of these variables, certain cases required imputation. Since population parameters do not classify on the basis of non-response, any cases in the sample data that included non-response must have the non-response imputed before weighting can be achieved. The following variables were affected by non-response and had values imputed: Household Income and to some extent Ethnicity.

Imputation Methods

Ethnicity was not formally imputed; rather cases were classified into Black/Non-Black and Hispanic/non-Hispanic cells. Respondents who classified themselves as white were placed into the white category; otherwise, they were placed into the non-white category. This included those who gave no response to the race/ethnicity question. In the case of those who responded they did not know the answer or refused, this affected less than 1% of the entire sample. Those who responded as "other" included about 1.4% of the sample. In both cases these were coded as Non-Black or Non-Hispanic.

In the process of imputing income, a few other variables required imputation to ensure that every case had a valid response. To impute income, the mean level of income by cell was used as a proxy for those households who did not know or refused to answer the income question. This affected 7.8% of the entire sample; in comparison with similar studies of this nature this is a small level of non-response. The variables used to impute income for non-response households were county of residence, household size, and housing tenure. It was felt that these variables would provide a fair amount of correlation and could explain differences in income level.

County and Household Size were not affected by any level of non-response so those variables were not modified. The county variable was collapsed into two cells: Central Counties (Clayton, Cobb, DeKalb, Douglas, Fulton, and Gwinnett) and Outlying Counties (Cherokee, Coweta, Fayette, Forsyth, Henry, Paulding, and Rockdale). In the case of owner/renter status there was a miniscule level of non-response (29 cases, less than 0.5% of the total sample). These cases had owner/renter status values imputed based on the following procedures:

1. Those in the "other" category for owner/renter status were re-coded based on the open-ended response. In all cases (6), it was deemed the respondents fit more closely into the "renter" category.
2. Those who responded they did not know their owner/renter status (23) had their values imputed based on their household size.
3. Those with household size less than 2 were put into the owner category and those with more than two were put into the renter category. It is assumed that these classifications could be arbitrary but with the low number of cases it is doubtful this has any discernible effect on the final estimates.

Therefore, mean income levels (for those cases that did submit a valid response to income) were generated for 16 cells (county - 2 cells, household size - 4 cells, and owner/renter status - 2 cells). These average income levels were then donated to households within these cells that did not respond to the income question. An examination of income classification between the original variable and the imputed variable indicate that cases were generally imputed around the middle of the income distribution.

Expansion Calculations

Once income was imputed, weights were generated based on the ratio between the proportion which exists in the population and the proportion in the sample. In all cases (except for Net Residential Density Level), Census 2000 counts were used as population estimates. In the case of Income, Hispanic/Non-Hispanic and Household Vehicle Ownership, population counts were organized by core and outlying counties rather than individual counties. Net Residential Density Level population estimates were taken from source material provided by the Atlanta Regional Commission, which indicated the number of households within each density level stratum. Race and Ethnicity estimates were treated slightly differently than the other weighting variables - in all other cases, counts of households were available. In the case of race and ethnicity, in which it was deemed Census 2000 counts would be preferable, person counts were used. To generate person counts from the sample data, a frequency distribution of race and ethnicity (recoded as Black/Non-Black and Hispanic/non-Hispanic) was generated weighted by household size. These percentages were then compared with population percentages from Census 2000.

Composite weights were generated based on the products of the underlying weights (nrhl, county, income, household size, race, ethnicity, and vehicle ownership). This composite weight was then normalized to ensure the number of weighted cases equaled the number of unweighted cases (8,069). An iterative proportional fitting process was also generated to ensure that weighted frequency distributions of county, household income, vehicle ownership and household size were identical to population proportions.

Expansion factors were produced to expand the sample to the entire population of households in the survey area based on Census 2000 counts (1,355,990). This factor represents one number based on the product of dividing population households by sample households (8,069). This factor was applied to each case and was the last step in weighting and expansion.



SURVEY RESULTS

The following section of this report provides an overview of the survey results. Data are presented by file type and include information from the household file, person file, trip file and vehicle file. All tables display final weighted data.

Household Survey Results

A total of 8,069 Atlanta households participated in the Atlanta Household Travel Survey. The household data includes demographic information about the households, such as household size, household vehicles, dwelling type, home ownership status, tenure, and computer ownership. It also includes summary statistics about the number of workers, students, and trips made during the 48-hour travel period.

The tables in this section of the report present the weighted results for the 8,069 Atlanta households and include the key household level variables collected during the survey.

The average number of household vehicles available was 1.54 vehicles. As shown in Table H-1, as the household size get larger, the average number of vehicles available to the household also increases. The total percentage of zero vehicle households in the study is 7.3 percent. Households with only one person were least likely of all household sizes to have a vehicle available (14.5 percent).

**Table H-1
Household Vehicle Availability**

Household Size	N	0	1	2+	Mean
One	1975	14.5%	71.5%	14.0%	1.00
Two	2823	4.1%	20.0%	75.9%	1.71
Three	1456	6.3%	18.2%	75.6%	1.69
Four+	1815	5.4%	17.9%	76.6%	1.71
Total	8,069	7.3%	31.8%	60.9%	1.54

Base: All households, weighted.

As shown in Table H-2, the average size of participating households was 2.39 persons. As expected, the net residential density level (nrld) of household's location has an inverse effect on household size. Households in the highest nrld (8+ du/acre) have a smaller average household size (1.94).

**Table H-2
Household Size**

NRDL	N	1	2	3	4+	Mean
0 to <2du/acre	4232	20.6%	37.0%	19.0%	23.3%	2.45
2 to <4du/acre	2394	23.6%	32.2%	19.7%	24.5%	2.45
4 to <6du/acre	700	33.2%	35.0%	13.1%	18.7%	2.17
6 to <8du/acre	364	38.0%	33.6%	10.7%	17.6%	2.07
8+ du/acre	379	43.6%	30.6%	13.2%	12.6%	1.94
Total	8069	24.5%	35.0%	18.0%	22.5%	2.39

Base: All households, weighted.

The average number of vehicles available to the household also decreases as the nrld of the household location increases. As shown in Table H-3, household in the 8+ du/acre have an average of 1.15 vehicles while households in the 0 to 2 du/acre have an average of 1.67 vehicles available. This outcome is probably due to a combination of household size and reduced need for dependency on vehicles.

**Table H-3
Household Vehicles by NRDL**

NRDL	N	0	1	2+	Mean
0 to <2du/acre	4232	3.6%	25.7%	70.7%	1.67
2 to <4du/acre	2394	9.2%	35.2%	55.6%	1.46
4 to <6du/acre	700	13.0%	42.2%	44.8%	1.32
6 to <8du/acre	364	15.6%	44.8%	39.7%	1.24
8+ du/acre	379	18.6%	47.2%	34.3%	1.15
Total	8069	7.3%	31.8%	60.9%	1.54

Table H-4 examines the distribution of workers at each household size level. As expected, the number of workers increases as household size increases. The average number of workers ranges from 0.63 in one person households to 1.41 in households with four or more people. The average number of workers overall is 1.12.

**Table H-4
Household Size by Number of Workers**

Household Size	N	0	1	2	3+	Mean
One	1975	37.3%	62.7%	0.0%	0.0%	0.63
Two	2823	19.7%	44.6%	35.7%	0.0%	1.16
Three	1456	7.6%	54.1%	33.2%	5.0%	1.36
Four+	1815	5.5%	57.3%	30.8%	6.5%	1.41
Total	8,069	18.7%	53.6%	25.4%	2.4%	1.12

Base: All households, weighted.

On average, there were 0.79 students in each household in the Atlanta area. The number of students ranges from 0.09 in one person households to 2.15 in households with four or more people.

**Table H-5
Household Size by Number of Students**

Household Size	N	0	1	2	3+	Mean
One	1975	91.7%	8.0%	0.1%	0.2%	0.09
Two	2823	76.9%	19.0%	3.6%	0.5%	0.28
Three	1456	25.5%	48.8%	20.8%	4.8%	1.06
Four+	1815	7.7%	14.0%	43.6%	34.6%	2.15
Total	8,069	55.7%	20.6%	14.8%	8.9%	0.79

Base: All households, weighted.

The Atlanta area respondents represented a variety of ethnic backgrounds. Just fewer than 60 percent are white, 32 percent African American, 5 percent Hispanic, and 1.4 percent Asian. Cherokee and Paulding Counties had the least amount of diversity represented in the survey.

Table H-6
County Distribution by Racial Groups

Geographic Area	N	White	Hispanic	African American	Asian American	Other
Cherokee	292	90.7%	3.8%	2.8%	1.6%	1.1%
Clayton	489	36.8%	9.3%	52.3%	0.3%	1.1%
Cobb	1349	73.3%	5.5%	18.7%	1.2%	1.2%
Coweta	186	67.0%	2.4%	27.0%	0.0%	3.5%
DeKalb	1481	35.9%	4.9%	56.1%	1.8%	1.3%
Douglas	195	74.7%	0.0%	22.5%	0.0%	2.9%
Fayette	185	84.8%	0.0%	11.4%	1.5%	2.2%
Forsyth	204	86.1%	8.0%	1.1%	0.0%	4.8%
Fulton	1898	45.8%	3.2%	47.2%	1.8%	2.0%
Gwinnett	1193	74.9%	7.4%	13.3%	2.1%	2.3%
Henry	245	73.7%	9.0%	14.2%	1.8%	1.3%
Paulding	167	89.1%	0.0%	4.8%	0.0%	6.1%
Rockdale	143	80.4%	3.3%	14.4%	0.0%	1.9%
Total	8028	59.5%	5.0%	32.2%	1.4%	1.9%

Base: All households, weighted.

The household income distribution for the study is shown in Table H-7. Larger size households are more likely to have higher incomes than smaller households with just around 40 percent of 3-person and 4+ person households with incomes in excess of \$75,000. This is consistent with average number of workers data shown in Table H-4 where larger households had a greater number of average workers.

Table H-7
Household Size Distribution by Income Range

Household Size	N	< \$30K	\$30- < \$50k	\$50k - < \$75k	\$75k+	DK/RF
One	1975	38.0%	25.4%	17.3%	11.8%	7.3%
Two	2823	18.6%	17.3%	20.6%	36.9%	6.0%
Three	1456	21.1%	14.8%	19.5%	40.0%	4.6%
Four+	1815	19.1%	15.9%	19.5%	39.9%	5.6%
Total	8069	23.9%	18.5%	19.3%	32.0%	6.2%

Base: All households, weighted.

In addition to demographic information on households, the Atlanta Household Travel Survey obtained data on residential and neighborhood behaviors and preferences. Some of this data is presented here in the household data section, while additional data is presented in the person data section.

As shown in Table H-8, the majority of households in the Atlanta region live in a single family home (76.4 percent). Households in locations with a net residential density level of 8+ du/acre are much more likely to live in other housing types. In fact, over 65 percent of households in the 8+ du/acre live in condos or apartments.

**Table H-8
Residence Type**

NRDL	N	Single family home	Condo or Townhouse	Duplex	Apartment	Mobile home or trailer	Other
0 to <2du/acre	4232	85.2%	4.1%	0.9%	7.8%	1.8%	0.2%
2 to <4du/acre	2394	74.7%	7.1%	1.2%	16.5%	0.3%	0.1%
4 to <6du/acre	700	63.6%	12.1%	3.2%	20.6%	0.0%	0.6%
6 to <8du/acre	364	56.5%	13.6%	2.9%	26.1%	0.2%	0.7%
8+ du/acre	379	30.7%	20.1%	3.5%	44.4%	0.0%	1.4%
Total	8069	76.4%	6.9%	1.4%	14.0%	1.0%	0.3%

A majority of Atlanta area residents (72.2 percent) have lived at their current address for more three or more years, while 16.3 percent reported living at their current residence for the past 1-3 years. Just over eleven percent (11.2 percent) of households are new to their home, having moved in during the past year. Households in areas with a higher nrld are more likely to have moved to the area within the past three years.

**Table H-9
Year Moved to Current Residence**

NRDL	N	Less than 1 Year	1 – 3 Years	More than 3 Years	DK/RF
0 to <2du/acre	4232	9.4%	14.3%	76.3%	0.3%
2 to <4du/acre	2394	13.6%	18.0%	68.4%	0.4%
4 to <6du/acre	700	12.5%	16.6%	70.8%	0.4%
6 to <8du/acre	364	13.8%	16.5%	69.7%	0.3%
8+ du/acre	379	16.5%	27.2%	56.4%	0.6%
Total	8040	11.5%	16.3%	72.3%	0.3%

Base: All households, weighted.

The data presented in Table H-9 is supported by the data presented in Table H-10 in that households in denser areas are more likely to move in the next three years than households in lower density areas. As shown in Table H-9, over 43 percent of household in a nrld of 8+ du/acre plan on moving in the next three years while only 26 percent of household in a nrld of 0-2 du/acre plan on moving.

**Table H-10
Moving in Next Three Years**

NRDL	N	Yes	No	Unsure
0 to <2du/acre	4232	26.3%	69.8%	3.9%
2 to <4du/acre	2394	33.2%	61.9%	4.9%
4 to <6du/acre	700	30.9%	63.8%	5.3%
6 to <8du/acre	364	38.5%	55.2%	6.2%
8+ du/acre	379	43.2%	51.0%	5.8%
Total	8069	30.1%	65.4%	4.5%

Households were also asked to rate the importance of various aspects of their neighborhood in their decision to move there. These include affordability, ease of walking, closeness to job, near transit, near interstates, closeness to shops, quality of schools, closeness of outdoor recreation,

low crime, and closeness to transit. A score of 1 represents “not at all important” and 5 indicates a rating of “very important.” The results are shown in Tables H-11 and H-12.

**Table H-11
Neighborhood Ratings**

NRDL	N	Affordability	Ease of Walking	Closeness to Job	Near Transit	Near Interstates
0 to <2du/acre	4232	3.91	3.05	3.28	2.09	3.56
2 to <4du/acre	2394	3.88	3.26	3.50	3.02	3.58
4 to <6du/acre	700	3.82	3.62	3.81	3.39	3.83
6 to <8du/acre	364	3.86	3.61	3.75	3.31	3.50
8+ du/acre	379	3.82	3.82	3.80	3.53	3.62
Total	8069	3.88	3.26	3.46	2.69	3.59

Based: All household members, weighted

As shown in Tables H-11 and H-12, the most important factor in a household’s decision to move to a particular neighborhood is crime (4.04). Affordability was the second most important factor (3.88). Of least importance is closeness to transit (2.69) and closeness to outdoor recreation (3.03). Household in denser areas put greater importance on low transportation costs (3.48), ease of walking (3.82), closeness to job (3.80), and closeness to transit (3.53) and less importance on the quality of the schools (2.74), crime (3.60), and affordability (3.82).

Households in less dense areas placed greater importance on affordability (3.91), the quality of schools (3.46), and low crime (4.24) and less importance on closeness to transit (2.09), transportation costs (2.97), ease of walking (3.06), and closeness to job (3.28).

**Table H-12
Neighborhood Ratings**

NRDL	N	Near Shops	Quality of Schools	Near Outdoor Rec	Low Crime	Low Trans Costs
0 to <2du/acre	4232	3.49	3.46	3.00	4.24	2.97
2 to <4du/acre	2394	3.60	3.43	2.98	3.94	3.19
4 to <6du/acre	700	3.87	2.99	3.21	3.90	3.63
6 to <8du/acre	364	3.52	2.87	3.14	3.78	3.60
8+ du/acre	379	3.63	2.74	3.15	3.60	3.48
Total	8069	3.57	3.32	3.03	4.04	3.18

Person Survey Results

A total of 21,323 household members participated in the Atlanta Household Travel Study. The person data includes demographic information about the household members, student data, employment data for first and second jobs, and health related information.

Person Demographics

The following tables show the distribution of household members by gender, educational attainment, licensed driver status, relationship to head of household, and disability status.

As shown in Table P-1, there was an almost equal distribution by gender in the survey respondent pool with 47.1 percent of people being male and 52.6 percent of people being female.

Table P-1
Gender of Household Members

Gender	N	Percent
Male	10033	47.1%
Female	11215	52.6%
DK/RF	75	0.4%
Total	21323	100.0%

Base: All household members, weighted

A total of 646 persons, or 4.7 percent, indicated that they had a disability which impacted their mobility.

Table P-2
Mobility Disability Status

Mobility Status	N	Percent
Yes	646	4.7%
No	12944	94.6%
DK/RF	95	0.7%
Total	13685	100%

Base: All licensed drivers, weighted

Relationship to the head of house was also obtained for all participating household members. As shown in Table P-3, respondents were directly related to the related to the head of household over 90% of the time.

Table P-3
Relationship to Head of Household

Relationship	N	Percent
Self	8071	37.9%
Spouse/Partner	4633	21.7%
Son/Daughter	6648	31.2%
Mother/Father/Mother in law / Father in law	465	2.2%
Other relative	896	4.1%
Live in help	61	0.3%
Not related	374	1.8%
DK/RF	202	0.9%
Total	21323	100.0%

Base: All household members, weighted.

Over 34 percent of persons in the Atlanta region have less than a high school education. This does, however include all household persons—even those less than 18 years of age.

Table P-4
Level of Education Attained

Education	N	Percent
Less than High School	7440	34.9%
High School Graduate	3364	15.8%
Some College	2813	13.2%
Vocational / Technical	414	1.9%
Undergraduate / BA	3984	18.7%
Graduate / Post Graduate	2902	13.6%
DK/RF	406	1.9%
Total	21323	100.0 %

Base: All household members, weighted.

Driver's license status was obtained for all participating household members age 16 or older. As shown in Table P-5, almost 90% of household members age 16 and older are licensed drivers.

Table P-5
Licensed Driver Status

License Status	N	Percent
Yes	13685	87.8%
No	1804	11.6%
DK/RF	100	0.7%
Total	15589	100%

Base: All household members age 16+, weighted.

A majority of Atlanta residents rate their overall health status as either excellent (23.3 percent) or very good (35.5 percent). About 12 percent rate their health status as fair or poor.

Table P-6
Overall Health

Health Status	N	Percent
Excellent	2004	23.3%
Very good	3047	35.5%
Good	2278	26.5%
Fair	799	9.3%
Poor	241	2.8%
DK/RF	224	2.6%
Total	8600	100%

Over eighty-six percent of respondents reported no use of public transit in the week previous to the study. Only 6.7 percent had used transit modes 1-4 times in the past week and just under five percent (4.7 percent) had used transit five or more times.

Workers were more likely to use transit with 6.2 percent using transit 1-4 times in the past week and 5.7 percent using transit five or more times.

**Table P-7
Employment Status by Transit Use**

Employment Status	N	No Use	<5 time/week	5+times/week	Don't Know
Employed	5715	86.3%	6.2%	5.7%	1.8%
Not Employed	2371	90.2%	6.8%	1.7%	1.4%
Unemployed	478	78.7%	11.8%	8.0%	1.4%
Total	8564	87.0%	6.7%	4.7%	1.6%

Just under 38 percent of persons reported having a working bicycle available for use. Persons who rated their health status as excellent or very good were more likely to have a bicycle available (67 percent) than persons in poor health (1.3 percent).

**Table P-8
Functioning Bicycle Available by Health Status**

Health Status	N	Percent
Excellent	916	28.4%
Very good	1244	38.6%
Good	815	25.3%
Fair	194	6.0%
Poor	43	1.3%
DK/RF	13	0.4%
Total	3225	100%

Employment Data

All respondents age 16 or older were asked about employment. Those respondents that indicated they were not employed were asked about their non-work status. All employed respondents were asked how many jobs they worked. The general employment information is shown in the following tables.

As shown in Table E-1, 65.7 percent of all respondents are employed either full-time or part-time. Over twelve percent are retired, 8.8 percent are homemakers, 3.2 percent disabled, and 8.3 percent are unemployed.

**Table E-1
Employment Status**

	N	Percent
Work full time	8714	55.9%
Work part time	1522	9.8%
Homemaker	1369	8.8%
Retired	1965	12.6%
Disabled	501	3.2%
Unemployed, but looking	611	3.9%
Unemployed, but not looking	679	4.4%
DK/RF	228	1.5%
Total	15589	100.0 %

Base: All household members age 16+, weighted.

Those respondents who indicated they were employed were asked if they worked at more than one job. A total 590, or 5.8 percent, indicated that they did have more than one job. Of those, 72.2 percent have one additional job and 26.4 percent have two or more additional jobs.

Table E-2
Number of Additional Paying Jobs

	N	Percent
1	426	72.2%
2	128	21.8%
3+	28	4.6%
DK/RF	9	1.5%
Total	590	100.0%

The distribution of workers by occupational category is shown in Table E-3. Fifty-five percent of respondents reported an occupation in the professional, managerial or technical field while 28.4 percent reported an occupation in the Sales or services category. Only 11.9 percent classified their application as clerical or administrative support.

Table E-3
Occupational Area

Occupation	N	Percent
Sales or service	2940	28.4%
Clerical or administrative support	1231	11.9%
Professional, managerial, or technical	5702	55.0%
Military	22	0.2%
Other	145	1.4%
DKRF	328	3.2%
Total	10368	100.0%

Base: All employed household members age 16+, weighted.

Most respondents reported that they drove to work (76.2 percent), while less than 3% reported they rode to work as a passenger. A total of 267 workers (5.2 percent) indicated that transit is their main mode to work.

Table E-4
Mode to Work

Mode to Work	N	Percent
Auto-Driver	3861	76.2%
Auto-Passenger	145	2.9%
Transit-Marta Bus	139	2.7%
Transit-CCT Bus	7	0.1%
Heavy Rail-Marta	121	2.4%
Walk/Bike	198	3.9%
Other	129	2.5%
Work From Home	75	1.5%
DK/RF	391	7.7%
Total	5066	100.0%

Tables E-5 outlines the availability of employee offered transportation benefits to Atlanta area workers. Workers are most likely to have employers who offer a flexible work schedule (51.2 percent). Workers also have benefits such as telecommuting (22.0 percent) and subsidized parking (17.0 percent). Almost twenty-three percent of workers do not have employee offered transportation benefits.

**Table E-5
Employer Offered Benefits**

Benefit	N	Percent
None	1156	22.8%
Subsidize Parking	863	17.0%
Subsidize Transit	789	15.6%
Flexible Schedule	2591	51.2%
Telecommuting	1115	22.0%
Carpool Assistance	712	14.1%
Guaranteed Ride	510	10.1%
Bicycle Storage	809	16.0%

Total respondents = 5065. Multiple choice question. Totals do not equal 100.

Table E-6 shows the usage levels of these transportation benefits among workers with benefits. Workers are most likely to utilize the flexible schedule (72.5 percent) and subsidized parking (65.4 percent) benefits. Of the workers with carpool assistance benefits, only 14.3 percent use them. Similarly, of the workers with bicycle storage, only 3.7 percent report using this benefit.

**Table E-6
Benefit Usage**

Benefit	n	Use
Subsidize Parking	863	65.4%
Subsidize Transit	791	43.9%
Flexible Schedule	2592	72.5%
Telecommuting	1115	46.0%
Carpool Assistance	712	14.3%
Guaranteed Ride	510	18.7%
Bicycle Storage	809	3.7%

Vehicle Availability Results

Of the respondents reporting owning a vehicle, Table V-1 represents the distribution of vehicle age. The majority of vehicles were built between 1990 and 1999 (65.4 percent) and only 2.7 percent were built before 1980.

**Table V-1
Distribution of Vehicle Age**

Year of Vehicle	N	Percent
Pre 1980	392	2.7%
1980-1989	1690	11.7%
1990-1999	9453	65.4%
2000+	2727	18.9%
DK/RF	188	1.3%
Total	14449	100.0%

As shown in Table V-2, most household vehicles are automobiles (60.9 percent), while 13.7 percent are trucks, 13.2 percent SUVs, and 10.2 percent are vans. Households are least likely to own recreational vehicles (0.2 percent) and motorcycles (0.9 percent).

Table V-2
Distribution of Vehicle Type

Vehicle Type	N	Percent
Auto	8805	60.9 %
Van	1470	10.2 %
SUV	1906	13.2 %
Pick-Up Truck	1981	13.7 %
Other Truck	76	0.5 %
Recreational Vehicle/ RV	33	0.2 %
Motorcycle	124	0.9%
Other	18	0.1 %
DK	13	0.1 %
RF	24	0.2 %
Total	14449	100.0 %

Base: All household vehicles, weighted.

Table V-3 shows the number of cylinders powering the vehicles reported for this survey. The most common engine type is 6-cylinder (39.7%). Also common are 4-cylinder engines (27.8 percent).

Table V-3
Number of Cylinders

Cylinders	N	Percent
3	29	0.2%
4	4022	27.8%
6	5734	39.7%
8	2567	17.8%
Other	42	0.3%
DK	1961	13.6%
RF	93	0.6%
Total	14449	100%

Base: All household vehicles, weighted.

Nearly all, 98.4 percent, respondents reported using a vehicle powered by regular gasoline fuel. Only 1 percent reported diesel and less than 1 percent combined reported alternative fuel sources such as electric or natural gas.

Table V-4
Fuel Type Used

Fuel Type	N	Percent
Gasoline	14241	98.4%
Diesel	148	1.0%
Electric	12	0.1%
Compressed Natural Gas	1	0.0%
Other	10	0.1%
DK	50	0.3%
RF	14	0.1%
Total	14449	100%

Base: All household vehicles, weighted.

An enclosed garage (40.5 percent) and the driveway (37.8 percent) are the most common places that people park their cars. Other places include carports (10.0 percent), the street or alley (6.0 percent), and parking lots (3.4 percent).

**Table V-5
Place Vehicle is Parked**

Place Parked	N	Percent
Enclosed garage	5853	40.5%
Carport	1450	10.0%
Driveway	5461	37.8%
Street/Alley	866	6.0%
Parking lot	498	3.4%
Yard	36	0.3%
Other	36	0.2%
DK	58	0.4%
RF	191	1.3%
Total	14449	100%

Base: All household vehicles, weighted.

Trip Indicators

Household Trips

The household file also contains summary variables that indicate the number and types of trips reported in the trip file. This includes number of places visited on diary day and number of trips.

Table T-1 provides a summary of total daily trips by the net residential density level of the household location. The data show that households in higher density areas have a lower daily average trip rate than households in low density areas.

**Table T-1
Average Daily Household Trip by NRDL**

NRDL	N	Day 1	Day 2
0 to <2du/acre	4232	8.63	8.27
2 to <4du/acre	2394	8.45	7.98
4 to <6du/acre	700	7.51	7.19
6 to <8du/acre	364	7.16	7.03
8+ du/acre	379	6.45	6.51
Total	8069	8.31	7.95

Base: All households, weighted.

Table T-2 illustrates the relationship between income and travel. The highest average number of trips per day was recorded among households with annual incomes of \$75,000 or more (10.54 and 10.04). Households with incomes under \$30,000 had the lowest trip rates at 5.79 for day one and 5.54 for day 2.

Table T-2
Average Household Trip Rates by Household Income

Income	N	Day 1	Day 2
<\$30K	1931	5.79	5.54
\$30-<50K	1496	7.40	7.07
\$50-<75K	1560	8.74	8.38
\$75K+	2582	10.54	10.04
DK/RF	500	7.50	7.14
Total	8069	8.31	7.95

Base: All households, weighted.

The number of available vehicles per household has a positive relation to the number of trips taken. The highest trip rates are among respondents reporting more than 2 vehicles (10.20 and 9.61) while the lowest household trip rates are among households with zero vehicles (4.60 and 4.06).

Table T-3
Daily Trips by Vehicles per Household

Number of Vehicles	N	Day 1	Day 2
0	592	4.59	4.28
1	2565	5.95	5.86
2+	4912	9.93	9.39
Total	8069	8.31	7.95

Base: All households, weighted

The number of trips also had a direct relation to the number of workers in the household. Households with more workers had greater overall trip rates for both day one and day two.

Table T-4
Daily Trips by Workers per Household

Number of Workers	N	Day 1	Day 2
None	1464	5.15	4.80
1	4334	8.59	8.19
2	2047	9.64	9.27
3+	224	11.31	10.98
Total	8069	8.31	7.95

Person Trips

Females averaged slightly more trips per day than did males.

Table T-5
Average Person Trip Rates by Gender

Gender	N	Trip Rate	Trip Rate
		Day 1	Day 2
Male	7863	3.72	3.63
Female	8651	4.07	3.97
Total	21323	3.90	3.80

As shown in Table T-6, total person trip rates are 3.89 for day 1 and 3.80 for day 2. Trip rates of persons under the age of 18 are significantly lower than persons over the age of 18.

**Table T-6
Average Person Trip Rates by Respondent Age**

Respondent Age	N	Trip Rate	
		Day 1	Day 2
Under 5	1830	2.97	2.99
5 to 15	3902	3.14	2.97
16 to 17	584	3.36	3.30
18+	14651	4.18	4.09
DK/RF	357	3.30	3.46
Total	21323	3.89	3.80

Trip Characteristics

Table T-7 shows the activity distribution for all trips. Activities include both activities at trip destinations as well as activities at home. The highest-ranking Main Activity was Sleep (19.8 percent), followed by Eating/preparing meals (16.6 percent) and Working (9.5 percent). The most frequent Secondary Activity was also Eating/preparing meals (11.6 percent) and entertainment (8.3 percent).

**Table T-7
Main Activity Distribution**

Activity	N	Percent
Eating/preparing meals	47977	21.4
Entertainment	26464	11.8
Visit friends/relatives	6331	2.8
Working	16359	7.3
Work related business	4219	1.9
School (attending classes)	7570	3.4
Incidental shopping	11592	5.2
Major shopping	2905	1.3
Watching children	3537	1.6
Household work/Outdoors work	9621	4.3
Fitness/Exercising	3372	1.5
Outdoor recreation	1165	.5
Medical/Dental	1747	.8
Community meetings	758	.3
Worship/religious meeting	23671	1.1
Banking, post office, bill payment	2480	1.1
Waiting for transportation	2554	1.1
Drop off/Pick someone up	11866	5.3
Sleep	38479	17.1
Rest/Relax	1324	.6
Pick up something/Drop something off	1391	.6
Personal (bath, shower, get dressed)	1827	.8
Personal Business	3162	1.4
Volunteer work	321	.1
Getting Ready	3767	1.7
Other at home activities	10348	4.6
Work related from home	896	.4
DK/RF	79	.0
Total	224479	100.0

The majority of respondents reported their mode of transportation as Auto/Van/Truck – Driver (69.6%). Other popular modes include auto-passenger (19.6 percent), walking (4.7 percent), and transit (2.1 percent).

Table T-8
Mode of Transportation for Trip

Mode	N	Percent
Auto/Van/Truck - Driver	81004	64.2%
Auto/Van/Truck - Passenger	28698	22.8%
Transit - MARTA bus	1697	1.3%
Transit - CCT bus	131	0.1%
Heavy rail - Marta	1126	0.9%
Dail-a-ride/ paratransit	26	0.0%
School bus	6879	5.5%
Taxi, shuttle bus, limousine	330	0.3%
Motorcycle/moped	16	0.0%
Bicycle	172	0.1%
Walk	5741	4.6%
Intercity bus	19	0.0%
Airplane	192	0.2%
Intercity train	15	0.0%
Other	22	0.0%
DK/RF	75	0.1%
Total	166015	100%