

Transportation for the 21st Century Household Travel Survey

TRAVEL SURVEY RESULTS FOR THE SJTPO REGION

PREPARED FOR
SOUTH JERSEY
TRANSPORTATION PLANNING ORGANIZATION

BY
NUSTATS RESEARCH & CONSULTING

IN ASSOCIATION WITH
CAMBRIDGE SYSTEMATICS

May 2001

Transportation for the 21st Century Household Travel Survey

TRAVEL SURVEY RESULTS FOR THE SJTPO REGION

PREPARED FOR
SOUTH JERSEY TRANSPORTATION
PLANNING ORGANIZATION

BY
NUSTATS RESEARCH & CONSULTING
IN ASSOCIATION WITH
CAMBRIDGE SYSTEMATICS

May 2001

South Jersey Transportation Planning Organization
18 North East Avenue
Vineland, NJ 08360

This report has been prepared by NuStats Research & Consulting in partial fulfillment of the contract between the Delaware Valley Regional Planning Commission and NuStats Research & Consulting to design and conduct a regional household travel survey. The preparation of this report was funded through federal grants from the U.S. Department of Transportation's Federal Highway Administration (FHWA) and the Pennsylvania and New Jersey Departments of Transportation. NuStats Research & Consulting is solely responsible for its findings and conclusions, which may not represent the official views or policies of the funding agencies.

Table of Contents

EXECUTIVE SUMMARY

1. INTRODUCTION.....	1
1.1 Background.....	1
1.2 Survey Purpose and Coverage.....	1
1.3 Survey Products.....	4
Procedures & Resource Manual.....	4
Pilot Study Report.....	4
1.4 Contents of the Report.....	4
2. SURVEY METHODS.....	7
2.1 Sample Design and Performance.....	7
Household Response Rates.....	14
Identification of Non-Response Bias.....	15
2.2 Advance Call and Notification.....	16
2.3 Recruitment and Respondent Packet Mailing.....	16
2.4 Reminder Calls and Retrieval.....	18
2.5 Administrative Variables.....	18
2.6 Data Processing.....	19
2.7 Geocoding.....	21
2.8 Quality Assurance.....	21
3. SURVEY RESULTS.....	23
3.1 Weight Calculations.....	23
Probability of Selection – Geography and Household Vehicle Availability.....	23
Probability of Selection – Telephone Lines per Household.....	24
Probability of Selection – Households per Telephone Number.....	25
Probability of Selection – Households with Episodic Phone Service.....	25
Normalization of Weights.....	26
3.2 Household Survey Results.....	27
Household Demographics.....	27
Household Trip Indicators.....	31
3.3 Person Survey Results.....	33
Person Demographics.....	33
Student Data.....	35
Employment Data.....	36
Data on Primary Job.....	38
Data on Secondary Job.....	42
Person Trip Indicators.....	44
3.4 Vehicle Availability Results.....	44
3.5 Travel Behavior Results.....	46
4. SURVEY EXPANSION AND TRAVEL RESULTS.....	53
4.1 Expansion Calculations.....	53
4.2 Survey Data Expanded.....	54
5. EVALUATION OF SURVEY RESULTS.....	57
CONCLUSION.....	61
APPENDIX A: Recruitment Questionnaire	
APPENDIX B: Retrieval Questionnaire	

List of Figures and Tables

Figure 1-1	Study Area Geography.....	3
Table 2-1	Sample Goals by County Planning Area.....	8
Table 2-2	Sample Goals by County and Household Vehicle Availability	10
Table 2-3	Comparison of Sample Goals and Actual Responses by County Planning Area	11
Table 2-4	Comparison of Sample Goals and Actual Responses by Household Vehicle Availability ...	13
Table 2-5	Household Response Rates	14
Table 2-6	Comparisons of Household Response Rates Among Metropolitan Areas	14
Table 2-7	Comparison of Survey and DVRPC Household Distributions by Vehicle Availability	15
Table 2-8	Comparison of Survey and Census Household Distributions by Household Size	15
Table 2-9	Comparison of Survey and Census Household Distributions by Household Income	15
Table 2-10	Receipt of Advance Letter	18
Table 2-11	Has E-Mail Account.....	19
Table 2-12	Distribution of Households by Day of Week.....	19
Table 2-13	NuStats' Continuous Data Flow Progression.....	19
Table 2-14	Address Geocoding Outcomes	21
Table 3-1	Distribution of Surveyed Households by County.....	24
Table 3-2	Distribution of Universe Households by County.....	24
Table 3-3	Weighting Factor to Adjust for Probability of Selection	24
Table 3-4	Total Number of Phone Lines per Household.....	25
Table 3-5	Total Number of Households per Phone Number	25
Table 3-6	Distribution of Households by Service Interruption Lengths	26
Table 3-7	Episodic Telephone Ownership Factor	26
Table 3-8	Household Vehicles: Unweighted and Weighted Distributions	27
Table H-1	Household Vehicle Availability	27
Table H-2	Household Size	28
Table H-3	Household Distribution by Number of Workers.....	28
Table H-4	Household Distribution by Number of Students	28
Table H-5	Household Distribution by Ethnic Groups	29
Table H-6	Household Distribution by Income Range.....	29
Table H-7	Distribution of Low Income Households by Sources of Income.....	29
Table H-8	Distribution by Household Dwelling Types.....	30
Table H-9	Year Moved to Current Residence	30
Table H-10	Home Ownership Status	30
Table H-11	Ownership of Second Home	31
Table H-12	Household Trips Rates by Place of Trip Ends	31
Table H-13	Household Trips by Trip Type	31
Table H-14	Summary of Household Trip Rates	32
Table H-15	Comparison of Motorized Trip Rates to NCHRP Trip Rates.....	32
Table H-16	Average Household Trip Rates by Workers.....	32
Table H-17	Average Household Trip Rates by Students.....	32
Table H-18	Average Household Trip Rates by Household Ethnicity	33
Table H-19	Average Household Trip Rates by Household Income	33

Table P-1	Gender of Household Members	33
Table P-2	Respondent Age.....	34
Table P-3	Licensed Driver Status	34
Table P-4	Relationship to Head of Household.....	34
Table P-5	Disability Status.....	35
Table S-1	Student Status.....	35
Table S-2	Level of School Attending.....	35
Table S-3	Number of Days Attend School.....	36
Table E-1	Employment Status	36
Table E-2	Status if Not Employed.....	36
Table E-3	Number of Jobs Held.....	37
Table E-4	Household Workers by Industry	37
Table W-1	Employer Type	38
Table W-2	Tenure at Current Job Site	38
Table W-3	Number of Days Worked	38
Table W-4	Number of Days Telecommuted	39
Table W-5	Compressed Work Week	39
Table W-6	Work on Saturday or Sunday	39
Table W-7	Vehicle Needed for Work	40
Table W-8	Employer Subsidies for Parking	40
Table W-9	Parking Location at Work	40
Table W-10	Employer Subsidies for Transit	41
Table W-11	Schedule Type	41
Table W-12	Work Start Times.....	41
Table W-13	Work End Times.....	42
Table W-14	Secondary Job: Employer Type	42
Table W-15	Secondary Job: Number of Days Worked.....	42
Table W-16	Secondary Job: Number of Days Telecommuted	43
Table W-17	Secondary Job: Typical Start Time	43
Table W-18	Secondary Job: Typical End Time	43
Table P-6	Average Person Trip Rates by Gender	44
Table P-7	Average Person Trip Rates by Respondent Age	44
Table V-1	Distribution of Vehicle Age	44
Table V-2	Distribution of Vehicle Type	45
Table V-3	Vehicle Ownership	45
Table V-4	Distribution of Vehicle Make.....	45
Table T-1	Place of Activities by County.....	46
Table T-2	Major Activities Reported by County	46
Table T-3	Reported Activities at All Places Visited.....	47
Table T-4	Distribution of Trip Purposes.....	47
Table T-5	Major Travel Modes by County	48
Table T-6	Detailed Mode Usage by County of Residence	48
Table T-7	Distribution of Travel Modes	48
Table T-8	Reported Trip Durations	49

Table T-9	Number Traveling Together on Auto Trips.....	49
Table T-10	Household Vehicles Used	49
Table T-11	Parking Type	50
Table T-12	Tolls Paid by Auto Drivers	50
Table T-13	Access Mode of Transit Riders	50
Table T-14	Egress Mode of Transit Riders.....	51
Table T-15	Number of Transfers Made by Transit Riders	51
Table 4-1	Distribution of Surveyed Households by County.....	53
Table 4-2	Distribution of Universe Households by County.....	54
Table 4-3	Expanded Survey Data Set.....	54
Table 4-4	Household Estimates by County	54
Table 4-5	Population Estimates by County	55
Table 4-6	Total Trips by Purpose	55
Table 4-7	Total Trips by Mode.....	55
Table 5-1	Household Survey Daily Trip Rates by Trip Purpose (All Modes)	58
Table 5-2	Household Survey Daily Trip Rates by Trip Purpose (Motorized Modes)	58
Table 5-3	Comparison of Household Survey Daily Trip Rates to NCHRP 365.....	59
Table 5-4	Comparison of Household Survey Daily Trip Rates to NCHRP Trip Rates	59
Table 5-5	Travel Modes.....	60
Table 5-6	Reported Trip Durations	60

EXECUTIVE SUMMARY

The purpose of this report is to document the methods used to conduct the Transportation for the 21st Century Household Travel Survey, as well as to present survey results. The study was conducted from March through December 2000 under the auspices of the Delaware Valley Regional Planning Commission and the Southern Jersey Transportation Planning Organization and funded through the Pennsylvania and New Jersey Departments of Transportation. Cambridge Systematics provided quality assurance under a subcontract to NuStats.

Household travel surveys such as this one are used to obtain information about work and non-work trip generation, trip distribution, modal choice, and traffic assignment as well as to obtain data on average vehicle occupancy. Updated household travel information can be used for modeling purposes as well as transportation planning projects such as high occupancy vehicle lanes, bicycle and pedestrian studies, welfare-to-work programs and development of traffic control studies. Prior to the Transportation for the 21st Century Survey, household travel surveys were conducted by the New Jersey Department of Transportation in 1987 for the New Jersey counties and by the Delaware Valley Regional Planning Commission in 1988 for the Pennsylvania counties. In addition, household travel data for Mercer County was collected as part of the 1997/98 Transportation Futures Project conducted for the North Jersey Transportation Planning Organization.

The study area consisted of the Pennsylvania counties of Bucks, Chester, Delaware, Montgomery, and Philadelphia (along with a small portion of Berks County); the New Jersey Delaware Valley counties of Burlington, Camden, Gloucester, and Mercer; and the South Jersey counties of Atlantic, Cape May, Cumberland, and Salem. The resultant data set contains demographic and travel data on 5,677 households in the 14-county study area. Of the 5,677 households that participated in the study, 2,666 were from the Delaware Valley region of Pennsylvania, 1,551 were from the Delaware Valley region of New Jersey, and 1,460 were from Southern Jersey. Data collection was guided by sampling goals that focused on the geographic location of the household (to the county planning area) and the number of household vehicles available. The resultant data set contains demographic and travel behavior information for all household members (regardless of age).

Like all recent household travel surveys, the Transportation for the 21st Century study relied on the willingness of area residents to complete diary records of all travel for a 24-hour period. It was based on telephone interviews of randomly selected households from the 14-county study area. 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 day" or 24-hour period on which to record their travel and activities. This travel day typically took place 7 to 10 days after the recruitment interview. Collection of the travel information was done through the use of a "retrieval interview."

There were 1,460 South Jersey households that participated in the study. Based on the 1997 DVRPC estimates of 193,891 households in the Delaware Valley region, this means that each household that participated in the study represented 133 households in the region when expanded. The 1,460 participating households were comprised of 3,077 people and had 2,626 vehicles available to them. The following is a synopsis of the travel and activity information provided during the course of this study.

Household Vehicle Availability. Data collection was guided by the desire to include in the final data set a sufficient distribution of households by vehicle availability to meet various modeling objectives. The desired goals and the distribution actually achieved are shown in Table E-1. As shown in that table, the goals were met or exceeded, with the exception of 3+ vehicle households, in which 94% of the goal was achieved.

**Table E-1
Comparison of Sample Goals and Actual Responses by Household Vehicle Availability**

Vehicles	Goal	Actual	Percent
0	92	97	105%
1	443	443	100%
2	572	588	103%
3+	352	332	94%
Totals	1459	1460	100%

Household Activities. All household members tracked travel and activities for a 24-hour period. Of the 24,206 activities reported, there was little variation in the distribution of reported activities across the study area.

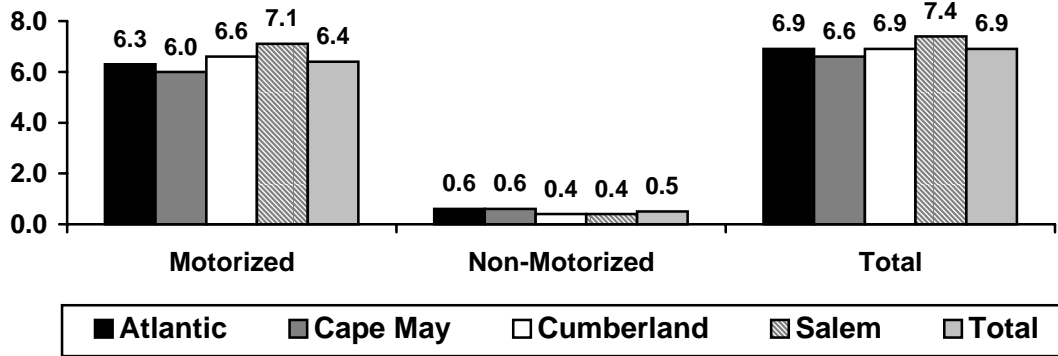
- **20% were related to family or personal business.** Cape May County residents reported the highest percentage of family/personal business activities while Cumberland County residents reported the lowest percentage (23% and 18%, respectively).
- **11% were work-related activities.** Households in Atlantic County reported more work activities (12%).
- **4% were school or school-related activities.**

Trip Purposes. For modeling purposes, it is also important to understand trip purpose. Closely related to the reported activities, the trip purposes included work, school, shopping, serve passengers, and “other”. There was little variation in the distribution of reported trip purposes across the study area.

- **14% of trips were for work purposes.** Respondents in Atlantic County reported slightly higher work trips (15%).
- **5% of trips were related to school.** A slightly higher proportion of school trips were reported in Cumberland County (7%).
- **12% of trips were for shopping.** Cape May County residents had a higher proportion of shopping trips (14%), while those in Atlantic County reported 11%.
- **8% of trips were made solely to serve passengers.** Atlantic County households reported slightly more serve passenger trips (9%), while Cape May County households reported a lower proportion (6%).

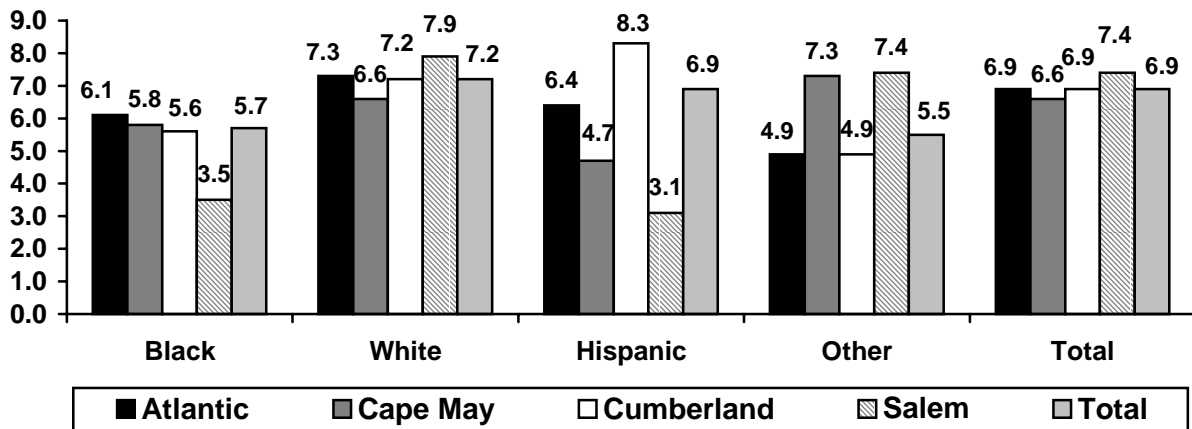
Household Trip Rates. The South Jersey households reported an average of 6.9 trips per household for the 24-hour travel period. As shown in Figure E-1, the trip rates varied by trip types: motorized vs. non-motorized. Cumberland County residents had the highest motorized trip rate (7.1), while Atlantic and Cape May Counties had higher non-motorized trip rates (0.6).

**Figure E-1
Household Trip Rates by Trip Type**



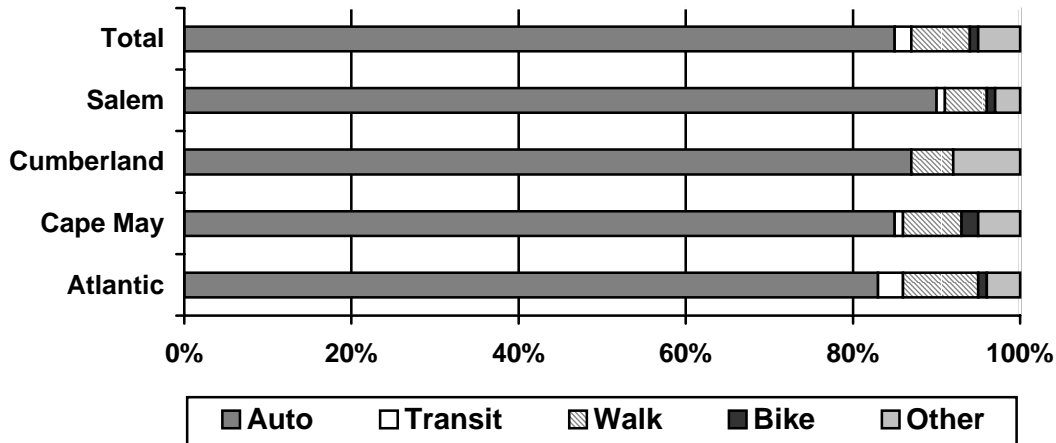
Caucasian households reported the highest overall daily trip rates (7.2), while those of African American descent reported the lowest (5.7).

**Figure E-2
Household Trip Rates by Household Ethnicity**



Travel Modes. For each trip reported, the respondents provided information on all travel modes used. This resulted in the collection of 10,193 modes used on the 10,124 reported trips. Eighty-five percent of all reported trips were made by auto (driver, passenger or motorcycle) while 2% were transit trips. The proportion of transit trips was highest in Atlantic County, while bike trips were highest in Cape May County.

**Figure E-3
Major Travel Modes**



The typical auto trip took about 19 minutes, while auto passengers reported trips of about 20 minutes in duration. Walk trips lasted about 14 minutes. Bus trips averaged 42 minutes.

**Table E-2
Distribution of Travel Modes**

Travel Mode	Total	
	Percent	Duration (minutes)
Auto driver	65.2%	18.85
Auto passenger	19.8%	19.97
Walk	7.2%	13.48
School Bus	4.1%	26.34
Bus	1.4%	42.42
Bicycle	0.9%	15.61
Shared ride	0.4%	27.41
Amtrak, other railroad	0.1%	62.42
Commuter van/shuttle	0.1%	33.55
Charter bus	0.1%	105.19
Subway/elevated rail	0.0%	54.14
Commuter rail	0.0%	65.00
Other	0.7%	22.43
Total	100.0%	

Base: All reported travel modes (multiple response allowed), weighted.

Summary of Auto Trips. Most work-related auto trips were made by single occupant vehicles (89%). As shown in Table E-3, Cape May County residents were more likely to carpool than respondents in other counties.

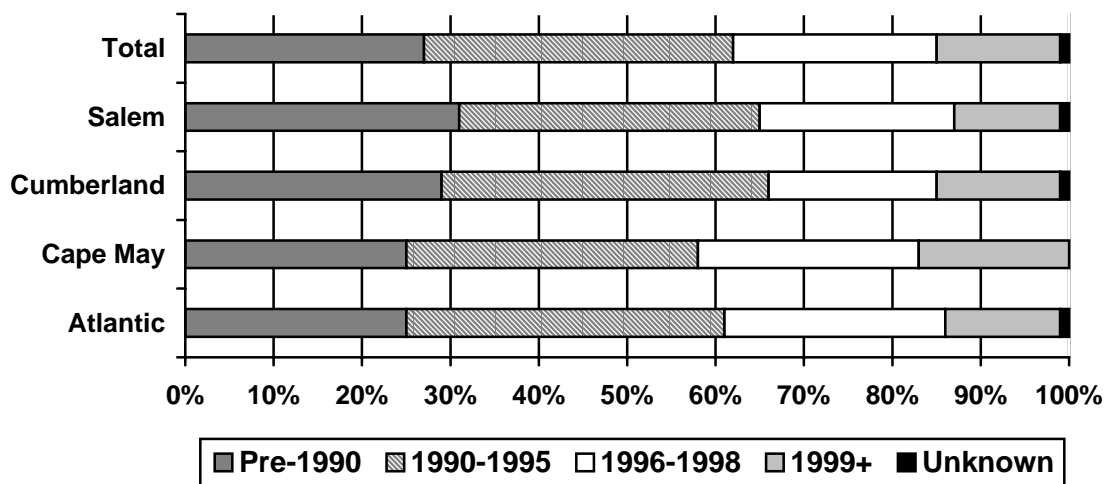
**Table E-3
Number Traveling Together For Work Using Auto**

County	N	1	2	3	4+	Total
Atlantic	651	88.6%	7.5%	1.8%	2.0%	100.0%
Cape May	239	85.4%	10.9%	2.9%	0.8%	100.0%
Cumberland	316	89.6%	7.0%	1.6%	1.9%	100.0%
Salem	174	90.2%	7.5%	1.1%	1.1%	100.0%
SJTPO Total	1,380	88.5%	8.0%	1.9%	1.7%	100.0%

Base: All auto trips for work purposes, weighted.

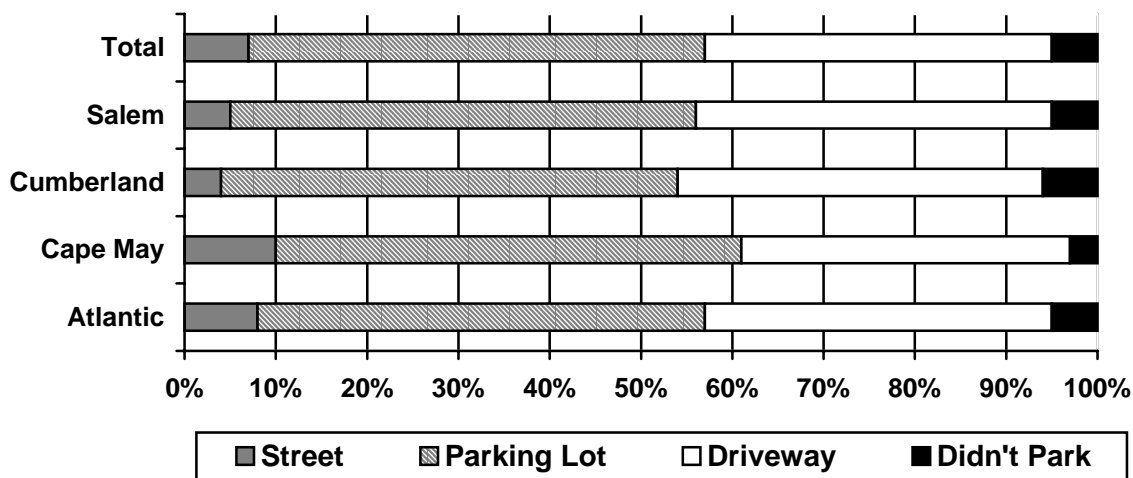
Detailed information was gathered for each household vehicle. As shown in Figure E-4, 35% of all household vehicles were built between 1990 and 1995. An additional 23% were built between 1996 and 1998, while 27% were built prior to 1990. The older (pre-1990) vehicles were more likely to be found in Salem County households. The newer vehicles (1999 or later) were more likely to be found in Cape May County.

**Figure E-4
Vehicle Age**



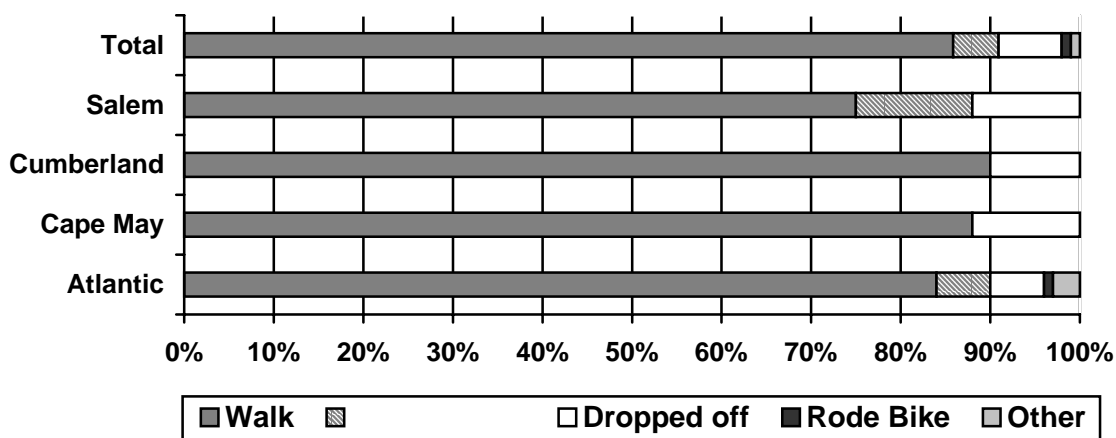
When respondents drove or rode in an automobile, most reported parking in a parking lot (50%) or in a driveway (38%). Street parking was most likely to take place in Cape May County.

**Figure E-5
Parking Locations**



Transit Trip Access. As demonstrated above, most transit trips were made in Atlantic County. Most transit trips began with walking (85%). Respondents in Salem County were most likely to drive and park to access transit (13%).

**Figure E-6
Access Mode of Transit Riders**



The data set produced as a result of the Transportation for the 21st Century Household Travel Survey represents an excellent source of regional travel behavior information for the transportation planning community. The project scope and complexity of the region, combined with careful survey design and execution, have provided for a high quality data set for use in future modeling efforts. As indicated by Cambridge Systematics thorough review of the final data set, as well as the tables and summaries presented throughout this report, the Transportation for the 21st Century data set will serve as a solid foundation for regional model update efforts.

1. INTRODUCTION

This report documents the design, implementation, and results of the Transportation for the 21st Century Household Travel Survey, conducted by NuStats from March through December 2000. The study was conducted under the auspices of the Delaware Valley Regional Planning Commission and the Southern Jersey Transportation Planning Organization and funded through the Pennsylvania and New Jersey Departments of Transportation.

This study is an essential element in the transportation planning and modeling efforts for the Delaware Valley and South Jersey regions. Travel behavior data collected through the conduct of this study will help transportation planning efforts in the region, including:

- Improving highways to reduce traffic congestion,
- Providing better regional train service,
- Changing bus routes to provide more convenient service,
- Building bike and walking paths,
- Moving people and freight efficiently, and
- Reducing air pollution from cars and trucks.

1.1 Background

The Transportation for the 21st Century Household Travel Survey sampled 5,677 households in the 14-county study area comprised of the Delaware Valley region of Pennsylvania and New Jersey and the southern-most portion of New Jersey. Of the 5,677 households that participated in the study, 2,666 were from the Delaware Valley region of Pennsylvania, 1,551 were from the Delaware Valley region of New Jersey, and 1,460 were from Southern Jersey.

Like all recent household travel surveys, the Transportation for the 21st Century study relied on the willingness of area residents to complete diary records of all travel for a 24-hour period. It was based on telephone interviews of randomly selected households from the 14-county study area. 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 day” or 24-hour period on which to record their travel and activities. This travel day typically took place 7 to 10 days after the recruitment interview. Collection of the travel information was done through the use of a “retrieval interview.”

1.2 Survey Purpose and Coverage

Household travel surveys are used to obtain information about work and non-work trip generation, trip distribution, modal choice, and traffic assignment as well as to obtain data on average vehicle occupancy. Updated household travel information can be used for modeling purposes as well as transportation planning projects such as high occupancy vehicle lanes, bicycle and pedestrian studies, welfare-to-work programs, and development of traffic control studies. Prior to the Transportation for the 21st Century Survey, household travel surveys were conducted by the New Jersey Department of Transportation in 1987 for the New Jersey counties and by the Delaware Valley Regional Planning Commission in 1988 for the Pennsylvania counties. In addition, household travel data for Mercer County was also collected

as part of the 1997/98 Transportation Futures Project conducted for the North Jersey Transportation Planning Organization.

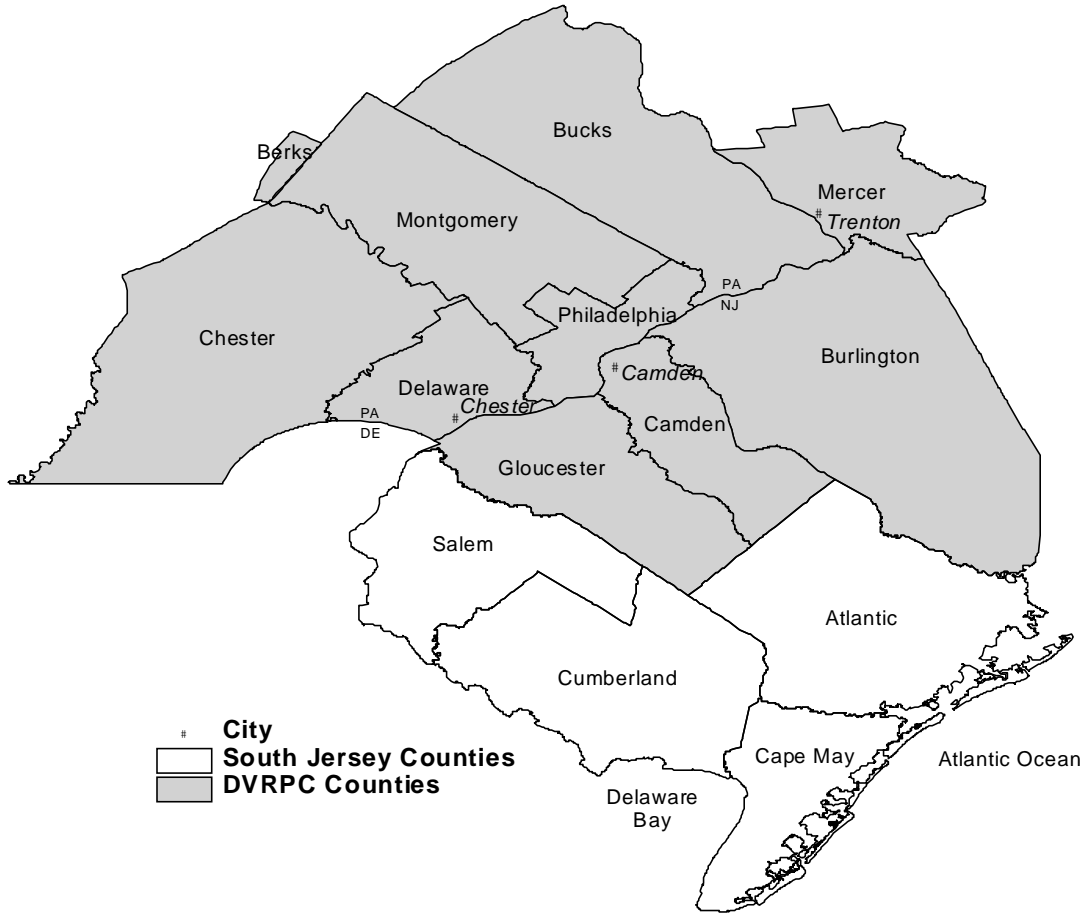
The purpose of the Transportation for the 21st Century Household Travel Survey was to provide data for continuing development and refinement of the Regional Travel Demand Forecasting Model, as well as to provide a better understanding of travel behavior in the Delaware Valley and South Jersey regions. Regional planners will use the data collected to:

- Validate current travel simulation models,
- Develop new travel and land use models,
- Improve air quality and conformity analysis,
- Prepare an environmental justice report, and
- Support other corridor and traffic studies.

The study area consisted of the Pennsylvania counties of Bucks, Chester, Delaware, Montgomery, and Philadelphia (along with a small portion of Berks County); the New Jersey Delaware Valley counties of Burlington, Camden, Gloucester, and Mercer; and the South Jersey counties of Atlantic, Cape May, Cumberland, and Salem. This geographic area is depicted on the map on the following page.

A total of 7,540 households were recruited to participate in the study. Of these, 5,677 households (75%) completed travel diaries (the information was gathered from all household members regardless of age). The 5,677 households represent 13,830 persons, 10,570 vehicles, and 48,646 trips across all counties surveyed.

Figure 1-1 Study Area Geography



1.3 Survey Products

This report is published in two versions, each of which focuses on one portion of the study area. As detailed above, the 14-county study area was comprised of 10 counties in the Delaware Valley region of Pennsylvania and New Jersey, while the remaining four counties comprise the southern-most portion of New Jersey. Version I of this report focuses on the Delaware Valley region while Version II focuses on the South Jersey region. Both versions contain the same Introduction and Survey Methods summary, but the report sections that detail survey results are tailored to the individual regions.

In addition to this report, two other study publications are available:

- a. **Procedures & Resource Manual.** The manual documents the data collection procedures and resources for the Transportation for the 21st Century Household Travel Survey. It contains 12 sections, the first two of which provide critical background information on the project and the sample expectations. Sections 3 through 8 document the sequential flow of data collection, followed by two sections that document the preparation of data for final delivery. The final sections of the manual provide key information regarding overall data organization and interviewer training materials.
- b. **Pilot Study Report.** The pilot study report documents the design, implementation and results of a pilot study conducted as part of this project. The primary objectives of the pilot study were to test and refine survey procedures, materials, and computer-assisted telephone interviewing (CATI) programs. The pilot study was designed as a “dress rehearsal” and allowed for the full evaluation of survey procedures, from sample generation to data file preparation. Objective criteria were specified to evaluate the pilot study results and provide a complete assessment of instruments, procedures, and processes. The findings suggest that the processes worked as planned, staff was sufficiently trained, and data flow occurred as expected. Specific changes were recommended to fine-tune the procedures, materials, and training.

1.4 Contents of the Report

The purpose of this report is to document the methods used to conduct the Transportation for the 21st Century 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,
- Survey Results,
- Survey Expansion and Travel Results, and
- Evaluation of 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 **Survey Results** chapter presents the demographic and travel data collected during the course of the Transportation for the 21st Century Household Travel Survey. The process used to weight the data is presented, along with the responses to all questions asked during the conduct of the survey. The data are presented both for the region as a whole, as well as for the counties that comprise the region.

The fourth chapter of the report contains the **Survey Expansion and Travel Results**. In this portion of the report, the weighted data are expanded to represent the population of the study area. The expanded data are then examined in terms of vehicle availability and travel patterns. The fifth and final section of the report contains an evaluation of the survey results from a modeling perspective.

2. SURVEY METHODS

The purpose of this chapter is to summarize the methods used to conduct the Transportation for the 21st Century Household Travel Survey. This survey was a multi-stage study, as it involved up to three telephone interviews and two mailings to the households. 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. The principal component of the pilot test was a complete run-through of survey procedures for a small sample of study area households. Pilot test households were recruited, mailed packets, and re-contacted after an assigned travel day to retrieve travel data. “Complete” data from 97 households were collected, processed, and subjected to quality control procedures. The results of the pilot test are summarized in the Pilot Test Report. 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 call and 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.

2.1 Sample Design and Performance

The Transportation for the 21st Century Household Travel Survey was intended to represent the diverse population and travel patterns in the study area. As such, the sample design for the survey was designed to guide the collection of data such that the resultant data set would include adequate representation of households by geography as well as household data availability. The sample design was specified based on four primary criteria:

- a. Produce statistically adequate observations at a geographic level that meet the modeling and administrative objectives of the Delaware Valley Regional Planning Commission and the South Jersey Transportation Planning Organization,
- b. Produce data depicting the diverse travel patterns and mode usage across the study area,
- c. Minimize selection bias across subgroups in the population, particularly those that are more difficult to reach (high income households, the very poor, mobile persons such as renters and others), and
- d. Maximize participation rates overall.

The first two criteria were fundamental to the design of the survey sample. They were addressed primarily through the statistical method applied, the sample frames used, the actual process for drawing the sample, and the documentation maintained. Meeting the remaining two criteria required a combination of sample design and the procedures for sample management.

The survey employed 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 type of probability sampling employed was stratified sampling in which the sample elements were drawn proportionately to the households within each of the 90 county planning areas (CPAs) that comprise the 14 counties in the region specified for the study. The sample was

randomly generated across all telephone exchanges within each CPA. Thus, the sample design for each CPA was a strict probability sample for that area. The sampling frame included both listed and unlisted telephone numbers, where “listed” numbers were those for which a household address could be identified.

To ensure sufficient samples for modeling, two sampling goals were established. The first was strictly geographical: the required number of completed households by CPA. The second goal was established to ensure sufficient representation of households by vehicle availability for each county in the study area. The sample goals are shown in Tables 2-1 and 2-2.

**Table 2-1
Sample Goals by County Planning Area**

County	CPA	Goal	Percent
Philadelphia (PA)	1	83	1.5%
	2	67	1.2%
	3	29	0.5%
	4	89	1.6%
	5	92	1.6%
	6	58	1.0%
	7	35	0.6%
	8	18	0.3%
	9	43	0.8%
	10	63	1.1%
	11	98	1.7%
Delaware (PA)	12	60	1.1%
	13	85	1.5%
	14	87	1.5%
	15	149	2.6%
	16	95	1.7%
	17	41	0.7%
	18	18	0.3%
Chester (PA)	19	62	1.1%
	20	37	0.7%
	21	24	0.4%
	22	50	0.9%
	23	75	1.3%
	24	25	0.4%
	25	39	0.7%
	26	27	0.5%
	27	19	0.3%
28	13	0.2%	
Montgomery (PA)	29	16	0.3%
	30	52	0.9%
	31	30	0.5%
	32	91	1.6%
	33	31	0.5%
	34	75	1.3%
	35	63	1.1%
	36	51	0.9%
	37	89	1.6%
38	21	0.4%	
Bucks (PA)	39	37	0.7%
	40	27	0.5%
	41	14	0.2%
	42	36	0.6%
	43	47	0.8%
	44	19	0.3%
	45	9	0.2%
	46	75	1.3%

	47	24	0.4%
	48	65	1.2%
	49	40	0.7%
	50	68	1.2%
	51	54	1.0%
Mercer (NJ)	52	94	1.7%
	53	69	1.2%
	54	103	1.8%
	55	21	0.4%
	56	44	0.8%
	57	48	0.9%
Burlington (NJ)	58	106	1.9%
	59	166	2.9%
	60	52	0.9%
	61	46	0.8%
	62	15	0.3%
Camden (NJ)	63	108	1.9%
	64	96	1.7%
	65	107	1.9%
	66	46	0.8%
	67	85	1.5%
Gloucester (NJ)	68	123	2.2%
	69	54	1.0%
	70	108	1.9%
	71	69	1.2%
Berks (PA)	72	11	0.2%
Delaware Valley		4186	74.1%
Salem (NJ)	75	80	1.4%
	76	126	2.2%
	77	94	1.7%
	78	36	0.6%
Cumberland (NJ)	79	112	2.0%
	80	147	2.6%
	81	76	1.3%
	82	35	0.6%
Atlantic (NJ)	83	43	0.8%
	84	55	1.0%
	85	74	1.3%
	86	84	1.5%
Cape May (NJ)	87	72	1.3%
	88	65	1.2%
	89	92	1.6%
	90	110	1.9%
	91	78	1.4%
	92	81	1.4%
SJTPO Region		1460	25.9%
Total		5646	100.0%

Table 2-2
Sample Goals by County and Household Vehicle Availability

County	Vehicles	Goal	Percent
Atlantic	0	38	0.7%
Atlantic	1	127	2.2%
Atlantic	2	147	2.6%
Atlantic	3+	79	1.4%
Bucks	0	18	0.3%
Bucks	1	89	1.6%
Bucks	2	214	3.8%
Bucks	3+	156	2.8%
Burlington	0	16	0.3%
Burlington	1	105	1.9%
Burlington	2	174	3.1%
Burlington	3+	90	1.6%
Camden	0	38	0.7%
Camden	1	118	2.1%
Camden	2	197	3.5%
Camden	3+	90	1.6%
Cape May	0	21	0.4%
Cape May	1	110	1.9%
Cape May	2	139	2.5%
Cape May	3+	91	1.6%
Chester	0	15	0.3%
Chester	1	67	1.2%
Chester	2	202	3.6%
Chester	3+	103	1.8%
Cumberland	0	18	0.3%
Cumberland	1	114	2.0%
Cumberland	2	151	2.7%
Cumberland	3+	88	1.6%
Delaware	0	32	0.6%
Delaware	1	144	2.6%
Delaware	2	206	3.6%
Delaware	3+	93	1.6%
Gloucester	0	15	0.3%
Gloucester	1	101	1.8%
Gloucester	2	148	2.6%
Gloucester	3+	92	1.6%
Mercer	0	24	0.4%
Mercer	1	121	2.1%
Mercer	2	160	2.8%
Mercer	3+	74	1.3%
Montgomery/Berks	0	24	0.4%
Montgomery/Berks	1	109	1.9%
Montgomery/Berks	2	288	5.1%
Montgomery/Berks	3+	130	2.3%
Philadelphia	0	243	4.3%
Philadelphia	1	295	5.2%
Philadelphia	2	171	3.0%
Philadelphia	3+	26	0.5%
Salem	0	15	0.3%
Salem	1	92	1.6%
Salem	2	135	2.4%
Salem	3+	94	1.7%
Total		5647	100.0%

The definition of a completed household was one in which travel and activity data were collected from all household members (regardless of age). A total of 5,677 households met this criterion. The distributions of completed households by CPA and County/Household Vehicles are shown in Tables 2-3 and 2-4.

**Table 2-3
Comparison of Sample Goals and Actual Responses
By County Planning Area**

County	CPA	Goal	Actual	Percent
Philadelphia (PA)	1	83	79	95.2%
	2	67	70	104.5%
	3	29	30	103.4%
	4	89	84	94.4%
	5	92	105	114.1%
	6	58	50	86.2%
	7	35	38	108.6%
	8	18	18	100.0%
	9	43	44	102.3%
	10	63	59	93.7%
	11	98	88	89.8%
	12	60	67	111.7%
Delaware (PA)	13	85	76	89.4%
	14	87	91	104.6%
	15	149	148	99.3%
	16	95	104	109.5%
	17	41	49	119.5%
	18	18	29	161.1%
Chester (PA)	19	62	62	100.0%
	20	37	38	102.7%
	21	24	26	108.3%
	22	50	50	100.0%
	23	75	73	97.3%
	24	25	30	120.0%
	25	39	42	107.7%
	26	27	26	96.3%
	27	19	22	115.8%
Montgomery (PA)	28	13	13	100.0%
	29	16	18	112.5%
	30	52	47	90.4%
	31	30	37	123.3%
	32	91	88	96.7%
	33	31	37	119.4%
	34	75	81	108.0%
	35	63	55	87.3%
	36	51	47	92.2%
	37	89	86	96.6%
Bucks (PA)	38	21	22	104.8%
	39	37	46	124.3%
	40	27	35	129.6%
	41	14	11	78.6%
	42	36	39	108.3%
	43	47	39	83.0%
	44	19	34	178.9%
	45	9	11	122.2%
	46	75	72	96.0%
	47	24	23	95.8%
	48	65	75	115.4%
	49	40	31	77.5%
Mercer (NJ)	50	68	63	92.6%
	51	54	52	96.3%
	52	94	89	94.7%

	53	69	69	100.0%
	54	103	92	89.3%
	55	21	25	119.0%
	56	44	48	109.1%
	57	48	51	106.3%
Burlington (NJ)	58	106	119	112.3%
	59	166	162	97.6%
	60	52	48	92.3%
	61	46	48	104.3%
	62	15	26	173.3%
Camden (NJ)	63	108	100	92.6%
	64	96	101	105.2%
	65	107	100	93.5%
	66	46	44	95.7%
	67	85	83	97.6%
Gloucester (NJ)	68	123	123	100.0%
	69	54	56	103.7%
	70	108	113	104.6%
	71	69	54	78.3%
Berks (PA)	72	11	6	54.5%
Delaware Valley		4186	4217	100.7%
Salem (NJ)	75	80	83	103.8%
	76	126	135	107.1%
	77	94	88	93.6%
	78	36	30	83.3%
Cumberland (NJ)	79	112	116	103.6%
	80	147	130	88.4%
	81	76	75	98.7%
	82	35	42	120.0%
Atlantic (NJ)	83	43	65	151.2%
	84	55	47	85.5%
	85	74	73	98.6%
	86	84	84	100.0%
Cape May (NJ)	87	72	94	130.6%
	88	65	66	101.5%
	89	92	87	94.6%
	90	110	98	89.1%
	91	78	68	87.2%
	92	81	79	97.5%
SJTPO Region		1460	1460	100.0%
Total		5646	5677	100.5%

**Table 2-4
Comparison of Sample Goals and Actual Responses
by Household Vehicle Availability**

County	Vehicles	Goal	Actual	Percent
Atlantic	0	38	48	126.3%
Atlantic	1	127	135	106.3%
Atlantic	2	147	164	111.6%
Atlantic	3+	79	82	103.8%
Bucks	0	18	14	77.8%
Bucks	1	89	107	120.2%
Bucks	2	214	207	96.7%
Bucks	3+	156	157	100.6%
Burlington	0	16	9	56.3%
Burlington	1	105	96	91.4%
Burlington	2	174	195	112.1%
Burlington	3+	90	103	114.4%
Camden	0	38	35	92.1%
Camden	1	118	122	103.4%
Camden	2	197	187	94.9%
Camden	3+	90	84	93.3%
Cape May	0	21	19	90.5%
Cape May	1	110	111	100.9%
Cape May	2	139	131	94.2%
Cape May	3+	91	71	78.0%
Chester	0	15	9	60.0%
Chester	1	67	73	109.0%
Chester	2	202	201	99.5%
Chester	3+	103	117	113.6%
Cumberland	0	18	16	88.9%
Cumberland	1	114	110	96.5%
Cumberland	2	151	154	102.0%
Cumberland	3+	88	83	94.3%
Delaware	0	32	27	84.4%
Delaware	1	144	150	104.2%
Delaware	2	206	224	108.7%
Delaware	3+	93	96	103.2%
Gloucester	0	15	10	66.7%
Gloucester	1	101	98	97.0%
Gloucester	2	148	150	101.4%
Gloucester	3+	92	88	95.7%
Mercer	0	24	23	95.8%
Mercer	1	121	109	90.1%
Mercer	2	160	165	103.1%
Mercer	3+	74	77	104.1%
Montgomery/Berks	0	24	19	79.2%
Montgomery/Berks	1	109	118	108.3%
Montgomery/Berks	2	288	285	99.0%
Montgomery/Berks	3+	130	130	100.0%
Philadelphia	0	243	222	91.4%
Philadelphia	1	295	310	105.1%
Philadelphia	2	171	164	95.9%
Philadelphia	3+	26	36	138.5%
Salem	0	15	14	93.3%
Salem	1	92	87	94.6%
Salem	2	135	139	103.0%
Salem	3+	94	96	102.1%
Total		5647	5677	100.5%

- a. **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. As shown in Table 2-5, the recruitment rate is 43%, the retrieval rate is 75% and the overall response rate for the study was 33% (43% * 75%). In other words, 33% of all eligible households that were contacted actually completed the survey.

**Table 2-5
Household Response Rates**

Region	County	Recruitment		
		Rate	Retrieval Rate	Overall Rate
Delaware Valley	Overall	44.5%	75.6%	33.6%
	Bucks (PA)	42.4%	76.0%	32.2%
	Chester (PA)	47.5%	76.2%	36.2%
	Delaware (PA)	51.2%	79.4%	40.6%
	Montgomery/Berks (PA)	46.8%	76.6%	35.8%
	Philadelphia (PA)	47.1%	74.6%	35.1%
	Burlington (NJ)	45.5%	75.5%	34.3%
	Camden (NJ)	39.9%	73.3%	29.2%
	Gloucester (NJ)	38.4%	77.4%	29.7%
SJTPO Region	Overall	40.8%	74.5%	30.4%
	Atlantic (NJ)	41.3%	76.1%	31.4%
	Cape May (NJ)	42.0%	74.1%	31.1%
	Cumberland (NJ)	34.1%	73.9%	25.2%
	Salem (NJ)	47.4%	73.4%	34.8%
	Total	43.4%	75.3%	32.7%

The response rates achieved for this study compare favorably with those from other recent household travel surveys with similar study design. A comparison is shown in Table 2-6.

**Table 2-6
Comparison of Household Response Rates
Among Metropolitan Areas**

Survey	Type	Rate
2000 Philadelphia/SJTPO	1-day	33%
1997/98 Metropolitan NY/NJ/CT	1-day	34%
1999 Seattle	2-day	32%

- b. 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 selected in a sample do not participate in the survey. In order to determine if non-response bias is an issue in the Transportation for the 21st Century Household Travel Survey, respondent provided data must be compared to census data and other available estimates to determine if specific sub-groups of the population are systematically declining to participate in the study. The goal is to have adequate representation from the study area population as a whole.

With an overall response rate of 33%, it is evident that a portion of eligible households did not participate in the study. Key demographics for retrieved households were compared to DVRPC's 1997 estimates (available only for household vehicles) and 1990 census data (for household size and household income) to understand the types of households not participating in the study. As shown in the following tables, the demographics of the households participating in the study tracked the 1997 estimates fairly well for household vehicles. The zero and one vehicle households are slightly underrepresented (9% and 5% respectively), while larger vehicle households are slightly over represented. The distribution of household size tracks the 1990 census data favorably, while the household income distributions (unadjusted for inflation) show a bias towards higher income households – resulting from the age of the census data and the positive correlation between income and telephone ownership.

**Table 2-7
Comparison of Survey and DVRPC Household Distributions by Vehicle Availability**

Household Vehicles	Survey Households	1997 DVRPC Estimates	Percent Difference
0	8.2%	17.2%	-9.0%
1	28.6%	33.8%	-5.2%
2	41.7%	35.5%	+6.2%
3+	21.5%	13.5%	+8.0%
Total	100%	100%	

**Table 2-8
Comparison of Survey and Census Household Distributions by Household Size**

Household Size	Survey Households	1990 Census Data	Percent Difference
1	25.2%	27.1%	-1.9%
2	37.9%	28.6%	+9.3%
3	15.7%	17.3%	-1.5%
4+	21.2%	26.9%	-5.7%
Total	100%	100%	

**Table 2-9
Comparison of Survey and Census Household Distributions by Household Income**

Household Income	Survey Households	1990 Census Data	Percent Difference
< \$15,000	8.8%	28.9%	-20.1%
\$15,000 to < \$25,000	10.5%	15.8%	-5.3%
\$25,000 to < \$35,000	11.9%	13.7%	-1.8%
\$35,000 to < \$50,000	15.2%	17.8%	-2.6%
\$50,000 to < \$75,000	24.5%	15.7%	+8.8%
\$75,000 to < \$100,000	15.1%	5.2%	+9.9%
\$100,000 to < \$125,000	7.1%	1.6%	+5.5%
\$125,000 to < \$150,000	3.0%	0.5%	+2.5%
\$150,000 or more	3.9%	0.9%	+3.0%
Total	100%	100%	

2.2 Advance Call and Notification

The purpose of the advance calls was to obtain or confirm mailing addresses for the sampled households. This was necessary given the fact that the study included both listed (i.e., household address known) and unlisted sample, the study utilized an advance call process to secure address information from unlisted households and pre-screen the sample for eligible households. In addition, household size, household vehicles, and household income were obtained. The advance call task reassured the respondent of project legitimacy, courteously persuaded respondents to provide basic information about the household, and provided answers to questions about the study and what participation entailed.

All households that were eligible and for whom addresses were obtained were mailed an advance letter and brochure. The advance letter served to introduce the household to the Transportation for the 21st Century Household Travel Survey. It was personalized to the household and printed on DVRPC or SJTPO 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.

Over the course of the entire study, advance calls were attempted on 20,423 sample pieces. Of these:

- 4,864 (24%) resulted in contact with eligible households.
- 7,364 (36%) were determined to be ineligible (non-working, non-household or non-voice lines, and
- 8,213 (40%) were unable to be classified as eligible or ineligible after eight call attempts.

Of the eligible households reached, 3,111 of the 4,864 agreed to receive an advance mailing (64%). The average length of the advance call was 4.3 minutes.

It is important to note that not all the sample received an advance call. For a majority of households with listed telephone numbers, the first contact was receipt of the advance notification. The first telephone contact for these households was the recruitment call.

2.3 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 CATI technology. The day following recruitment, personalized diaries were prepared for each household and mailed.

The recruitment calls began in March 2000 and continued through May 2000, then began again in September 2000 and continued until November 2000, allowing for breaks during the summer months and Thanksgiving holiday. Over the course of the recruitment effort, 35,018 pieces of sample were called. Of these:

- 13,205 (38%) resulted in contact with eligible households.
- 13,427 (38%) were determined to be ineligible (non-working, non-household or non-voice lines, and
- 8,386 (24%) were unable to be classified as eligible or ineligible after 8 call attempts

Of the eligible households reached, 7,540 of the 13,205 agreed to participate in the study (57%). The average length of the recruitment call was 18.6 minutes. The recruitment instrument performed well. All respondents provided data for most questions (48 of 86 or 56%). Marginal item non-response was noted for 30 variables, while the income-related questions had the highest non-response. Item non-response by question is as follows:

a. Household Questions (5 out of 29 had non-response)

- Income sources (asked if income < \$25k or income refused) – 25.4%
- Household income – 13.5%
- # Units in apartment building – 12.7%
- Length of time stayed at 2nd residence – 8.8%
- Receipt of advance letter – 8.5%
- Household ethnicity – 1.8%

b. Person Questions (31 out of 55 had non-response)

- Cost to park at school - 21.3% (asked of all students, regardless of reported mode to school)
- Cost of taking transit to work – 20.9%
- Time to walk from parking location to work – 11.2%
- Ending time for 2nd job – 11.2%
- Starting time for 2nd job – 10.7%
- Employer subsidizes transit costs – 9.3% (asked of all workers, regardless of reported mode to work)
- Type of disability – 6.9%
- Employer subsidized parking costs – 6.9% (asked of all workers, regardless of reported mode to work)
- Variation in work start time – 5.9%
- Variation in work end time – 5.9%
- Work parking location – 5.0%
- Activity if not employed – 4.4%
- Industry of 2nd job – 4.2%
- Work end time – 4.0%
- Mode to school – 3.8%
- Work start time – 3.7%
- Occupation of 2nd job – 3.7%
- Mode to work – 3.2%
- Cost to park at work – 3.2%
- Industry – 3.1%
- Type of work schedule – 2.9%
- Days worked on 2nd job – 2.9%
- Occupation – 2.8%
- Days telecommuted for 2nd job – 2.7%
- Weekdays worked – 2.6%
- Tenure at main job – 2.3%
- Vehicle needed for work – 2.2%
- Employer type – 2.1%
- Age – 1.5%
- Telecommuting days – 1.2%
- Weekend work detail – 1.1%

c. Vehicle Questions (2 out of 5 had non-response)

- Vehicle model – 2.6%
- Vehicle ownership – 1.0%

2.4 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 March 2000 and continued through May 2000, then began again in September 2000 and continued until December 2000, allowing for breaks during the summer months and Thanksgiving holiday. Over the course of the retrieval effort, all 7,540 recruited households were called. Of these, 5,677 (75%) resulted in completed household interviews. For the remaining 1,863 households (7540 – 5677) only demographic information is available (no travel data). The average length of the retrieval call was 18.6 minutes.

The retrieval instrument itself performed well. All respondents provided data for most questions (22 of 29 or 76%). Marginal item non-response was noted for seven variables, six of which were related to transit fare method of payment and fare amount paid. Item non-response by question is as follows:

- First fare payment method (cash, token, etc.) – 19.4%
- Second fare payment method – 13.3%
- Third fare payment method – 13.3%
- Third fare amount paid – 11.1%
- Second fare amount paid – 5.2%
- First fare amount paid – 2.9%
- Toll amount paid – 1.4%

2.5 Administrative Variables

Three questions on the recruitment questionnaire collected information necessary for data processing. These included whether the household had received an advance letter, whether the respondent had an email account, and the day of the week the household completed its diary task.

Table 2-10
Receipt of Advance Letter

County	N	Yes	No	Don't Recall	Not Sent	Total
Atlantic	643	24.6%	12.9%	57.9%	4.7%	100.0%
Cape May	283	31.4%	15.5%	43.8%	9.2%	100.0%
Cumberland	355	24.2%	13.8%	57.2%	4.8%	100.0%
Salem	179	30.0%	11.7%	52.8%	5.6%	100.0%
SJTPO Total	1460	26.5%	13.5%	54.3%	5.7%	100.0%

Base: All households, weighted.

**Table 2-11
Has E-Mail Account**

County	N	Yes	No	Refused	Total
Atlantic	643	7.9%	91.8%	0.3%	100.0%
Cape May	283	7.1%	92.2%	0.7%	100.0%
Cumberland	355	8.7%	90.1%	1.1%	100.0%
Salem	179	8.9%	89.4%	1.7%	100.0%
SJTPO Total	1460	8.0%	90.2%	0.5%	100.0%

Base: All households, weighted.

**Table 2-12
Distribution of Households by Day of Week**

County	N	Monday	Tuesday	Wednesday	Thursday	Friday	Total
Atlantic	643	14.6%	20.7%	20.2%	21.2%	23.3%	100.0%
Cape May	283	21.1%	18.3%	18.7%	18.7%	23.2%	100.0%
Cumberland	355	21.0%	18.5%	18.5%	23.5%	18.5%	100.0%
Salem	179	14.0%	19.0%	20.1%	27.0%	20.1%	100.0%
SJTPO Total	1460	17.4%	19.4%	19.5%	20.6%	21.9%	100.0%

Base: All households, weighted.

2.6 Data Processing

The data collected through the advance calls, recruitment interviews 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 last night, geocoding progress, etc.); exception reports showed lack of movement – how many advance called households could not geocode and therefore were not mailed an advance notification? Both were critical to successful completion of the project.

**Table 2-13
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 telephone numbers go to Stage 3
3	Advance Calls – Sampled households are contacted to confirm / obtain home addresses and key demographic data (household size, household vehicles, and household income).	<ul style="list-style-type: none"> If household agrees to receive advance mailing and address is confirmed, goes to Stage 4 If household elects to receive advance mailing and address is changed, goes to Stage 2 If address not obtained, sample cannot progress
4	Advance Mailing – Introductory letter with study brochure are mailed.	<ul style="list-style-type: none"> If letter is mailed, goes to Stage 5 If letter is not mailed, exception report generated to indicate reason
5	Recruitment Call – Households are recontacted to secure participation in the study. Those who agree	<ul style="list-style-type: none"> If the interview is completed, goes to Stage 6 If the interview is not completed, exception

	to participate provide demographic data and are assigned travel days.	<ul style="list-style-type: none"> report is generated If interview is not attempted, sample status is updated and sample is scheduled for callback according to sample management rules
6	Geocode Habitual Addresses – work and school addresses are geocoded.	<ul style="list-style-type: none"> If address geocodes, goes to Stage 7 If address does not geocode, exception report generated and also proceeds to Stage 7 but flagged with address information need
7	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 8 If packet is not mailed, exception report generated to indicate reason
8	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 9 If household needs new packet, goes to Stage 7 If household is rescheduled, can go to Stage 7 or 9 If household refuses, exception report is generated and assigned to interviewer specializing in refusals
9	Travel Days – Household members record travel on assigned day.	
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 provides partial data, exception report is generated and household does not progress 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, exception report is generated and household is assigned for callback / correction
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
15	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

2.7 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. At the conclusion of the project, 31,537 addresses comprised the “location” file for the 5,677 households that completed the study. Of these, 94% were successfully matched to latitude/longitude coordinates. The distribution of addresses by type and geocoding status is shown in Table 2-14.

Table 2-14
Address Geocoding Outcomes

Address Type	Matched	Unmatched	% Matched	Out of Area
Home	5,677	0	100%	0
Habitual (work & school)	8,712	715	92%	495
Other Locations	13,991	1,173	92%	774
Total	28,380	1,888	94%	1,269

2.8 Quality Assurance

The data that summarizes the demographic and travel behavior characteristics of the 5,677 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 (includes total trips; motorized and non-motorized trips; and home-based work, home-based other, and non-home-based work trips)

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.

3. SURVEY RESULTS

The Transportation for the 21st Century Household Travel resulted in the creation of a data set that contains the demographic and travel behavior characteristics of 5,677 households in the 14-county study area. Of those 5,677 households, 1,460 were from the 4-county South Jersey region. These 4 counties fall under the jurisdiction of the South Jersey Transportation Planning Organization (SJTPO) for regional transportation planning.

The 1,460 South Jersey households, when weighted, have 3,077 members, 2,197 vehicles, and reported a total of 10,124 trips. The purpose of this chapter is to document the procedures for weighting the data and to present the weighted survey results.

3.1 Weight Calculations

The creation of a household-level weight factor for the South Jersey households is comprised of five elements that aim to adjust the survey data to correct for differential rates of sampling that occurred and telephone ownership patterns.

a. Probability of Selection – Geography and Household Vehicle Availability

Under ideal sampling conditions, the study area is relatively homogenous with respect to telephone ownership. In those instances, the weight calculations would only need to take into account the sample size (the actual number of telephone numbers drawn and made available for contact) and the estimated universe of households within the study area. The unique relationship of those two numbers for each county would be the probability of selection, and the inverse of them would be the weight factor that would be applied to each household based on its county of residence.

The South Jersey region does not have this relative homogeneity. Certain locations had very high levels of telephone ownership turnover and very different rates of working telephone numbers, while others were much more stable. The first factor involved in weight calculation incorporated the probability of selection and took into account the heterogeneity of the counties in the study area. This approach combined weighting with geographic balancing and used the actual number of completed households and the universe of households by county.

The following tables illustrate the factor calculation process for the county strata: the number of completed households and household vehicles (Table 3-1), the number of households by vehicle availability in the universe (Table 3-2) and the weighting factor, which accounts for the probability of selection (Table 3-3). To explain how the specific weights contained in Table 3-3 were developed, the following example is provided for Atlantic County households with zero vehicles.

- A total of 48 Atlantic County 0-vehicle households completed the household travel survey, which is 3.3% of the total households in the SJTPO sample. This is shown in Table 3-1.
- According to a combination of DVRPC's 1997 Zonal Population and Employment Estimates and 1990 Census household vehicle availabilities, 7.33% of the households in the study area were 0-vehicle Atlantic County households, as displayed in Table 3-2.
- With a uniform sample, the percent of totals calculated for the sample and the universe would be the same, setting the probability of selection to 1.0. In the case of Atlantic County, the 0-vehicle survey households represented 3.3% of the total, while they

accounted for 7.3% of the universe. To create the factor for 0-vehicle Atlantic County households, the distribution of surveyed households was brought into line with the population of that same county. Specifically, 7.3% was divided by 3.3% to create the weight factor of 2.2297.

- This process was repeated for all cells in both Tables 3-1 and 3-2.
- Since the weights were applied by county, there is no need for a weight factor for the entire study region.

**Table 3-1
Distribution of Surveyed Households by County**

County	0-vehicles	1-vehicle	2-vehicles	3+-vehicles	Total
Atlantic	3.3%	9.2%	11.2%	5.6%	29.3%
Cape May	1.3%	7.6%	9.0%	4.9%	22.8%
Cumberland	1.1%	7.5%	10.5%	5.7%	24.8%
Salem	1.0%	6.0%	9.5%	6.6%	23.1%
Total	6.7%	30.3%	40.2%	22.8%	100.0%

**Table 3-2
Distribution of Universe Households by County**

County	0-vehicles	1-vehicle	2-vehicles	3+-vehicles	Total
Atlantic	7.33%	15.63%	15.38%	5.56%	43.90%
Cape May	2.05%	8.26%	6.89%	2.33%	19.53%
Cumberland	2.98%	8.68%	8.92%	3.73%	24.31%
Salem	1.19%	4.15%	5.02%	1.91%	12.27%
Total	13.55%	36.72%	36.21%	13.53%	100.0%

**Table 3-3
Weighting Factor to Adjust for Probability of Selection**

County	0-vehicles	1-vehicle	2-vehicles	3+-vehicles
Atlantic	2.2297	1.6903	1.3691	0.9907
Cape May	1.5730	1.0867	0.7676	0.4787
Cumberland	2.7179	1.1518	0.8456	0.6553
Salem	1.2392	0.6965	0.5272	0.2911

b. Probability of Selection – Telephone Lines per Household

The probability of selection calculation also assumed that each household in the universe had an equal probability of selection. In other words, it assumed that each household had one phone line, and therefore one chance of selection. As shown in Table 3-4, this was not the case in the Delaware Valley region as 16% of the households indicated they had more than one working phone line that was not dedicated solely for fax or modem use. By determining the number of lines represented (# phone lines multiplied by # households with that many lines), the 4,217 Delaware Valley households reported having 1,724 telephone (voice) lines available for their use.

The weighting factor to account for multiple phone numbers per household was created through a two-step process. First the actual number of voice lines available to each household was determined by subtracting the number of dedicated fax lines from the total phone lines available to the household. Then, FACTOR2 was created to adjust the data to compensate for cases where more than one phone line was available. Given the fact that not all households had only one line, those with one line were actually sampled at less than

one chance of selection. These households (with only one line) therefore needed a factor of slightly more than one to reflect the disparity.

**Table 3-4
Total Number of Phone Lines per Household**

# Phone Lines per Household	# Households	# Lines Represented	FACTOR2
1	1,233	1,233	1.1808
2	198	396	0.5
3	23	69	0.33
4	4	16	0.25
5	2	10	0.20
Total	1,460	1,724	

c. Probability of Selection – Households per Telephone Number

The next weighting factor adjusted for multiple households sharing the same phone number. A total of three South Jersey households reported sharing a phone number with one other household, so the 1,460 phone numbers in the final sample actually represent 1,462 households. FACTOR3 was developed to adjust this so that each telephone number represented only one household.

**Table 3-5
Total Number of Households per Phone Number**

# Households per Phone Lines	# Phone Numbers	# Households Represented	FACTOR3
1	1,458	1,458	1.0013
2	2	4	2.0
Total	1,460	1,462	

d. Probability of Selection – Households with Episodic Phone Service

To account for non-telephone owning households in a telephone survey, an adjustment is required using data reported by those households reporting episodic telephone service. Episodic phone ownership is defined as telephone service that is turned on or off over a given period of time, largely due to a lack of financial resources (telephone service is disconnected due to non-payment and re-activated when the household is able to pay the outstanding bill). Households with episodic telephone service differ from households without telephones (i.e., households that have not had any telephone service established). They are also different from households who have been without service for a period of less than two weeks, as those service interruptions are typically associated with weather or equipment issues.

As shown in Table 3-6, most households (92%) were non-episodic (i.e., they reported no interruption of telephone service in the past year). An additional 363 households (7%) reported service interruptions of less than 2 weeks. However, 29 households (1%) reported having telephone interruption that lasted 2 weeks or longer in the year prior to the survey. These households represent the other non-telephone households with episodic service in the region.

**Table 3-6
Distribution of Households by Service Interruption Lengths**

Length of Service Interruption	Frequency	Percent
No service interruptions (non-episodic)	1,352	92.6%
Less than 2 weeks (non-episodic)	95	6.5%
2 weeks but less than 1 month	5	0.3%
1 month but less than 3 months	4	0.3%
3 months but less than 6 months	0	0.0%
6 months but less than 1 year	4	0.3%
Total	1,460	100%

To determine the weighting factor required to adjust the data for episodic telephone ownership, the incidence of episodic telephone ownership in the South Jersey region was compared to non-telephone ownership data as reported in the March 2000 Current Population Survey (CPS) conducted jointly by the Bureau of Labor Statistics and the Bureau of the Census. Using the customized data access software provided on the CPS website, it was determined that 4.7% of households in New Jersey were non-telephone households (this includes both episodic and hard-core non-telephone ownership categories).

In reality, only about half of the CPS non-telephone households are episodic. This rate is based on a general pattern observed in anecdotal evidence collected through in-person interviews and postcard follow-up surveys conducted with non-telephone households by NuStats on other studies. There have been no papers published that can serve as a resource in this area. Based on NuStats experience, the CPS distribution was adjusted to allow for a direct comparison with the South Jersey data. Once the adjustment was made, FACTOR4 was a straightforward calculation, as shown in Table 3-7.

**Table 3-7
Episodic Telephone Ownership Factor**

Is phone service episodic?	SJTPO Households	SJTPO Percent	CPS Web Data	Adjusted CPS	FACTOR4
No	1,447	99.11%	95.34%	97.67%	0.9855
Yes	13	0.89%	4.66%	2.33%	2.6180
Total	1,460	100%	100%	100%	

e. Normalization of Weights

If the data weights were based on Factors 1 through 4 as presented in the tables above, the weighted data would represent 1,573 households rather than the 1,460 as actually contained in the data set. To account for this and still maintain the relative place of each household after weighting, all households were given a FACTOR5 value of 0.92816.

Once each household received a value for each of the five factors, the weight was calculated through a straight multiplication of factors 1 through 5. The weight was applied in the analysis of the data results as presented in the remainder of this report. An example of the effect of the weighting on the data is shown in Table 3-8, which shows the unweighted and weighted distributions of responses to the household vehicle question.

**Table 3-8
Household Vehicles: Unweighted and Weighted Distributions**

Household Vehicles	Unweighted Distribution	Weighted Distribution
0	8.2%	14.6%
1	28.6%	38.4%
2	41.7%	35.3%
3+	21.5%	11.7%
Total	100%	100%

3.2 Household Survey Results

A total of 1,460 South Jersey households participated in the Transportation for the 21st Century 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 second homes. It also includes administrative data (tracking advance letter receipt, e-mail availability and day of week assigned for travel) and summary statistics about the number of places and trips made during the travel day.

The tables in this section of the report present the weighted results for the 1,460 South Jersey households and include all household level variables collected during the survey.

a. Household Demographics

The following tables present the demographic characteristics of the South Jersey households that participated in the study. The demographic information includes household vehicles, household size, number of workers number of students, ethnicity, household income, and identification of welfare households. The data also includes type of dwelling, tenure at current address, ownership status, and whether a second home is owned.

As shown in Table H-1, Salem County had the highest average number of vehicles per household (1.65 vehicles), while Atlantic County had the lowest (1.44 vehicles). Overall, the region's households reported an average of 1.50 vehicles per household.

**Table H-1
Household Vehicle Availability**

	N	0	1	2	3+	Total	Mean
Atlantic	645	18.2%	36.5%	34.6%	10.7%	100.0%	1.44
Cape May	282	10.9%	45.1%	33.5%	10.6%	100.0%	1.48
Cumberland	355	13.0%	38.0%	35.8%	13.2%	100.0%	1.58
Salem	178	11.2%	35.4%	39.3%	14.0%	100.0%	1.65
SJTPO Total	1460	14.7%	38.4%	35.3%	11.6%	100.0%	1.50

Base: All households, weighted.

The average size of the South Jersey households that participated in the study was 2.11 persons. Households in Cumberland County had the highest size (2.21 persons), while Cape May households were the smallest, on average (2.01 persons).

Table H-2
Household Size

County	N	1	2	3	4+	Total	Mean
Atlantic	645	35.9%	40.1%	11.5%	12.6%	100.0%	2.08
Cape May	282	34.3%	44.5%	10.2%	11.0%	100.0%	2.01
Cumberland	355	32.7%	37.7%	14.4%	15.2%	100.0%	2.21
Salem	178	32.2%	42.8%	8.3%	16.7%	100.0%	2.17
SJTPO Total	1460	34.4%	40.7%	11.5%	13.4%	100.0%	2.11

Base: All households, weighted.

There were an average of 0.93 workers per household in the South Jersey region. Cumberland County had the highest average number of workers (0.94), while Cape May County had the lowest average (0.86 workers).

Table H-3
Household Distribution by Number of Workers

County	N	0	1	2	3+	Total	Mean
Atlantic	645	39.1%	32.0%	24.7%	4.2%	100.0%	0.95
Cape May	282	42.2%	33.0%	21.6%	3.2%	100.0%	0.86
Cumberland	355	41.7%	28.2%	25.9%	4.2%	100.0%	0.94
Salem	178	39.7%	32.4%	24.6%	3.4%	100.0%	0.91
SJTPO Total	1460	40.4%	31.4%	24.3%	3.9%	100.0%	0.93

Base: All households, weighted.

On average, there were 0.39 students per household in the South Jersey region. Households in Cumberland County had the highest average number of students (0.49), while households in Cape May County had the lowest average (0.33 students).

Table H-4
Household Distribution by Number of Students

County	N	0	1	2	3+	Total	Mean
Atlantic	645	80.3%	9.6%	6.2%	3.9%	100.0%	0.36
Cape May	282	80.2%	10.6%	6.0%	3.2%	100.0%	0.33
Cumberland	355	71.3%	16.1%	7.6%	5.1%	100.0%	0.49
Salem	178	74.9%	12.8%	8.9%	3.4%	100.0%	0.42
SJTPO Total	1460	77.4%	11.8%	6.8%	4.0%	100.0%	0.39

Base: All households, weighted.

The South Jersey respondents represent a variety of ethnic backgrounds. Eighty percent of the respondents were white, 13% African American, and 3% Hispanic. Atlantic County respondents were the most diverse, while Cape May County respondents were the least diverse.

Table H-5
Household Distribution by Ethnic Groups

County	N	Black/African	White	Asian/Pacific	American	Hispanic	Other	Total
		American		Islander	Indian	(specify)		
Atlantic	645	18.0%	73.4%	2.0%	0.6%	3.9%	2.1%	100.0%
Cape May	282	2.5%	93.6%	0.4%	0.4%	0.7%	2.4%	100.0%
Cumberland	355	15.8%	77.2%	0.0%	1.1%	4.5%	1.4%	100.0%
Salem	178	9.6%	88.2%	0.6%	0.6%	0.6%	1.7	100.0%
SJTPO Total	1460	13.4%	80.1%	1.0%	0.7%	3.1%	0.0%	100.0%

Base: All households, weighted.

Twenty-nine percent of all South Jersey households reported a household income between \$25,000 and \$50,000. Twenty-seven percent reported incomes between \$50,000 and \$100,000, while an additional 27% reported incomes of less than \$25,000. Atlantic County had the highest proportion of high-income households (\$100k+) while Cumberland County had the higher proportion of low-income households (< \$25k).

Table H-6
Household Distribution by Income Range

County	N	<\$25k	\$25k-<\$50k	\$50k-<\$100k	\$100k+	Refused	Total
Atlantic	645	25.2%	27.6%	29.8%	6.1%	11.4%	100.0%
Cape May	282	26.1%	29.3%	26.9%	6.0%	11.7%	100.0%
Cumberland	355	31.9%	33.6%	22.6%	3.7%	8.2%	100.0%
Salem	178	25.3%	23.0%	32.0%	5.6%	14.0%	100.0%
SJTPO Total	1460	27.0%	28.7%	27.8%	5.5%	11.0%	100.0%

To assist with monitoring and measuring the effect of recent welfare-to-work initiatives in the region, all South Jersey households that reported an income of less than \$25,000 or refused to provide an income were asked about the sources of their household income. The purpose of this question was to specifically identify households that received welfare benefits, in order to enhance the welfare-to-work initiatives underway. As shown in Table H-7, 1% of the South Jersey households that reported incomes of less than \$25,000 or refused to provide income received welfare benefits in 1999.

Table H-7
Distribution of Low Income Households (<\$25k) by Source of Income

County	N	Welfare	Other Govt	None	Refused	Total
			Sources			
Atlantic	24	1.6%	36.2%	38.6%	23.6%	100.0%
Cape May	10	0.0%	12.7%	63.6%	23.7%	100.0%
Cumberland	9	1.4%	58.0%	27.5%	13.1%	100.0%
Salem	4	3.1%	28.1%	59.4%	9.4%	100.0%
SJTPO Total	47	1.4%	36.2%	43.3%	19.1%	100.0%

Base: All households reporting incomes less than \$25,000 or that refused to provide income, weighted.

South Jersey respondents were most likely to live in a single-family, detached structure (73%). About 15% of respondents reported living in apartments. Atlantic County had the highest proportion of apartment dwellers (20%), while Salem County had the highest proportion of respondents in single-family detached structures (84%).

**Table H-8
Distribution of Household Dwelling Types**

County	N	Single family (detached)	Single family (attached)	Apartment	Other	Total
Atlantic	645	65.3%	10.6%	20.1%	3.6%	100.0%
Cape May	282	79.5%	9.9%	8.8%	1.8%	100.0%
Cumberland	355	74.2%	8.4%	13.8%	3.7%	100.0%
Salem	178	83.8%	5.6%	7.8%	2.8%	100.0%
SJTPO Total	1460	72.5%	9.2%	14.9%	3.2%	100.0%

Base: All households, weighted.

The majority of South Jersey respondents have lived at their current address for more than 5 years (75%), while 21% have lived there for 1 to 5 years. Most newcomers to the region, moving here within the past year, were in Cumberland County (6%).

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

County	N	Within the past year	1 to 5 years ago	More than 5 years ago	Refused	Total
Atlantic	645	3.3%	22.4%	74.1%	0.2%	100.0%
Cape May	282	4.6%	20.6%	74.8%	0.0%	100.0%
Cumberland	355	5.9%	19.7%	74.1%	0.0%	100.0%
Salem	178	2.2%	17.9%	79.9%	0.0%	100.0%
SJTPO Total	1460	4.1%	20.9%	74.9%	0.1%	100.0%

Base: All households, weighted.

Most respondents are homeowners (77%). The majority of renters (27%) were from Atlantic County, while the largest proportion of homeowners was in Cape May County (85%).

**Table H-10
Home Ownership Status**

County	N	Rent	Own/buying	Other	Total
Atlantic	645	27.4%	72.3%	0.2%	100.0%
Cape May	282	14.5%	84.5%	.7%	100.0%
Cumberland	355	25.4%	74.1%	.3%	100.0%
Salem	178	16.1%	83.3%	0.6%	100.0%
SJTPO Total	1460	23.0%	76.6%	0.3%	100.0%

Base: All households, weighted.

A total of 6% of South Jersey respondents reported owning in a second home. Cape May had the highest proportion of second-home owners (9%). Atlantic County had the lowest proportion of second-home owners (5%).

Table H-11
Ownership of Second Home

County	N	Yes	No	Total
Atlantic	645	5.3%	94.7%	100.0%
Cape May	282	8.5%	91.5%	100.0%
Cumberland	355	6.2%	93.8%	100.0%
Salem	178	6.1%	93.9%	100.0%
SJTPO Total	1460	6.2%	93.8%	100.0%

Base: All households, weighted.

b. Household Trip Indicators

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. In addition, the number of trips is broken out by purpose (home-based-work, home-based-other, and non-home-based) and mode (motorized or non-motorized).

Table H-12
Household Trip Rates by Place of Trip Ends

County	N	Home-Based Work	Home-Based Other	Non-Home Based	Total Trips
Atlantic	645	1.31	3.74	1.89	6.94
Cape May	282	1.10	3.75	1.77	6.62
Cumberland	355	1.22	3.84	1.85	6.91
Salem	178	1.28	4.16	2.00	7.43
SJTPO Total	1460	1.25	3.82	1.87	6.93

Base: All households, weighted.

Table H-13
Household Trip Rates by Trip Type

County	N	Motorized	Non-motorized	Total
Atlantic	645	6.30	0.64	6.94
Cape May	282	6.03	0.59	6.62
Cumberland	355	6.55	0.36	6.91
Salem	178	7.05	0.39	7.43
SJTPO Total	1460	6.40	0.53	6.93

Base: All households, weighted.

**Table H-14
Summary of Household Trip Rates**

Classification	Households in Survey	Home-Based Work Trip Rate	Home-Based Other Trip Rate	Non-home Based Trip Rate	Total Trip Rate
1-person	502	0.44	1.66	1.01	3.10
2-person	594	1.26	3.21	1.70	6.17
3-person	168	2.12	5.68	3.12	10.91
4-person	117	2.56	7.78	2.90	13.24
5+ person	78	2.53	12.28	4.48	19.30
Total	1460	1.25	3.82	1.87	6.93
0-vehicle	214	0.40	2.08	0.75	3.23
1-vehicle	561	0.73	3.05	1.37	5.15
2-vehicle	515	1.71	4.78	2.51	9.00
3+ vehicle	170	2.60	5.58	3.01	11.19
Total	1460	1.25	3.82	1.87	6.93

Base: All households, weighted.

**Table H-15
Comparison of Motorized Trip Rates to NCHRP Trip Rates**

Classification	Households in Survey	Survey Total Trip Rate	NCHRP Total Trip Rate
One person households	502	2.86	4.2
Two person households	594	5.78	7.3
Three person households	168	10.09	9.3
Four person households	117	12.44	12.0
Five + person households	78	16.80	14.8
Total	1460	6.40	
Zero vehicle households	214	1.81	4.1
One vehicle households	561	4.79	6.3
Two vehicle households	515	8.59	9.7
Three + vehicle households	170	10.82	11.8
Total	1460	6.40	

Base: All households, weighted.

**Table H-16
Average Household Trip Rates by Workers**

County	N	0 workers	1 worker	2 workers	3+ workers	Total
Atlantic	645	4.29	6.90	10.23	12.65	6.94
Cape May	282	4.28	6.84	10.11	11.62	6.62
Cumberland	355	3.82	6.20	10.90	17.33	6.91
Salem	178	4.35	7.84	10.87	15.15	7.43
SJTPO Total	1460	4.18	6.86	10.46	13.99	6.93

Base: All households, weighted.

**Table H-17
Average Household Trip Rates by Students**

County	N	0 students	1 student	2 students	3+ students	Total
Atlantic	645	5.20	10.57	14.02	22.67	6.94
Cape May	282	5.01	10.94	14.22	18.67	6.62
Cumberland	355	4.85	9.66	13.65	17.10	6.91
Salem	178	5.52	9.89	14.31	21.79	7.43
SJTPO Total	1460	5.12	10.24	14.00	20.24	6.93

Base: All households, weighted.

Table H-18
Average Household Trip Rates by Household Ethnicity

County	N	Black	White	Hispanic	Other	Total
Atlantic	645	6.13	7.29	6.44	4.93	6.94
Cape May	282	5.77	6.64	4.68	7.27	6.62
Cumberland	355	5.57	7.17	8.30	4.91	6.91
Salem	178	3.51	7.89	3.14	7.39	7.43
SJTPO Total	1460	5.73	7.20	6.91	5.49	6.93

Base: All households, weighted.

Table H-19
Average Household Trip Rates by Household Income

County	N	< \$25k	\$25k-<\$50k	\$50k-<\$100k	\$100k+	Refused	Total
Atlantic	645	3.41	7.04	9.55	8.94	6.61	6.94
Cape May	282	3.57	6.91	9.58	10.45	3.87	6.62
Cumberland	355	3.85	7.68	9.43	10.41	7.18	6.91
Salem	178	3.57	7.02	10.43	10.91	6.75	7.43
SJTPO Total	1460	3.59	7.20	9.66	9.76	6.18	6.93

Base: All households, weighted.

A total of 3077 South Jersey household members participated in the Transportation for the 21st Century Household Travel Survey. The person data includes demographic information about the household members, student data, and employment data for first and second jobs.

3.3 Person Survey Results

a. Person Demographics

The following tables show the distribution of household members by gender, age, licensed driver status, relationship to head of household, and, if disabled, disability type. As shown in Table P-1, about half the participating household members were male and half female. In Cape May County, there was a greater proportion of females as compared to male participants.

Table P-1
Gender of Household Members

County	N	Male	Female	Refused	Total
Atlantic	1338	47.3%	52.7%	0.0%	100.0%
Cape May	569	45.0%	54.7%	0.4%	100.0%
Cumberland	783	47.5%	52.5%	0.0%	100.0%
Salem	388	45.4%	53.9%	0.8%	100.0%
SJTPO Total	3077	46.7%	53.2%	0.1%	100.0%

Base: All household members, weighted.

As part of this study, all household members were required to participate by completing travel diaries. As shown in Table P-2, most participants were between the ages of 19 and 64 (54%). An additional 26% were 65 years of age or older, while 15% were under the age of 16.

**Table P-2
Respondent Age**

County	N	15 or under	16 to 18	19 to 64	65+	Refused	Total
Atlantic	1338	14.9%	2.0%	55.5%	26.2%	1.4%	100.0%
Cape May	569	12.1%	3.2%	51.5%	30.8%	2.5%	100.0%
Cumberland	783	18.2%	3.7%	53.8%	23.3%	0.9%	100.0%
Salem	388	16.2%	2.8%	53.5%	26.5%	1.0%	100.0%
SJTPO Total	3077	15.4%	2.7%	54.1%	26.3%	1.4%	100.0%

Base: All household members, weighted.

Driver's license status was collected for all participating household members age 16 or older. As shown in Table P-3, 84% of all household members age 16 or older reported having valid driver's licenses.

**Table P-3
Licensed Driver Status**

County	N	Yes	No	Refused	Total
Atlantic	1139	82.0%	17.3%	0.7%	100.0%
Cape May	499	85.2%	14.2%	0.6%	100.0%
Cumberland	640	83.6%	15.3%	1.1%	100.0%
Salem	325	88.0%	11.7%	0.3%	100.0%
SJTPO Total	2604	83.7%	15.5%	0.8%	100.0%

Base: All household members age 16+, weighted.

Most household members that participated in the study were either the respondent (47%) or related to the respondent (51%). Only 1% of participating household members were not related. The largest proportion of non-related participants was in Cumberland County.

**Table P-4
Relationship to Head of Household**

County	N	Respondent	Related	Not Related	Unknown	Total
Atlantic	1338	48.1%	50.6%	1.3%	0.1%	100.0%
Cape May	569	49.7%	48.9%	0.9%	0.5%	100.0%
Cumberland	783	45.3%	53.1%	1.4%	0.1%	100.0%
Salem	388	46.1%	53.6%	0.0%	0.3%	100.0%
SJTPO Total	3077	47.4%	51.3%	1.1%	0.2%	100.0%

Base: All household members, weighted.

As shown in Table P-5, 6% of participating household members reported having disabilities. The greatest number of disabled survey participants was reported in Cape May County, while Atlantic County reported the least (8% and 5%, respectively).

**Table P-5
Disability Status**

County	N	Disabled	Not Disabled	Refused	Total
Atlantic	1338	4.9%	94.8%	0.3%	100.0%
Cape May	569	7.7%	92.3%	0.0%	100.0%
Cumberland	783	6.6%	93.1%	0.3%	100.0%
Salem	388	7.0%	93.0%	0.0%	100.0%
SJTPO Total	3077	6.1%	93.7%	0.2%	100.0%

Base: All household members, weighted.

b. Student Data

For those respondents identified as students, data on school level, and number of days attending school were obtained. This information is displayed in the following tables. Overall, 19% of participating household members reported attending school at some level. Cumberland County had the highest proportion (22%), while Cape May County had the lowest (16%).

**Table S-1
Student Status**

County	N	Yes	No	Refused	Total
Atlantic	1338	17.2%	82.7%	0.1%	100.0%
Cape May	569	16.3%	83.7%	0.0%	100.0%
Cumberland	783	22.1%	77.7%	0.3%	100.0%
Salem	388	19.6%	80.4%	0.0%	100.0%
SJTPO Total	3077	18.6%	81.3%	0.1%	100.0%

Base: All household members, weighted.

Most students were in primary school (Kindergarten through 6th grade) or secondary school (7th through 12th grades) (40% and 35%, respectively). Cape May had the lowest percentage of students in daycare or preschool, while Atlantic County had the highest percentage (2% compared to 12%).

**Table S-2
Level of School Attending**

County	N	Daycare/ Preschool	K thru 6th	Grades 7- 12	Vo-Tech/ Adult	College	Refused	Total
Atlantic	230	12.2%	40.9%	31.7%	1.7%	11.7%	0.0%	100.0%
Cape May	93	2.2%	35.5%	41.9%	2.2%	14.0%	4.3%	100.0%
Cumberland	173	7.6%	41.0%	35.3%	4.1%	11.6%	0.6%	100.0%
Salem	76	10.4%	36.4%	35.1%	3.9%	14.3%	0.0%	100.0%
SJTPO Total	571	8.7%	39.6%	35.0%	2.8%	12.4%	1.4%	100.0%

Base: All household members that attend school, weighted.

Most students reported attending school five days per week (87%), while 13% reported attending less than 5 days.

Table S-3
Number of Days Attend School

County	N	Less than 5	5 days	Refused	Total
Atlantic	230	12.6%	87.4%	0.0%	100.0%
Cape May	93	15.2%	84.8%	0.0%	100.0%
Cumberland	173	11.0%	89.0%	0.0%	100.0%
Salem	76	17.1%	82.9%	0.0%	100.0%
SJTPO Total	571	13.0%	86.9%	0.2%	100.0%

Base: All household members that attend school, weighted.

c. 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 whether they worked one job or more than one job. The employment information is shown in the following tables. Forty three percent of the participating household members work full-time, while 9% work part-time and the remaining 48% were not employed.

Table E-1
Employment Status

County	N	Full-Time	Part-Time	Not Employed	Total
Atlantic	1139	45.3%	8.3%	46.4%	100.0%
Cape May	499	38.6%	10.4%	51.0%	100.0%
Cumberland	640	44.3%	8.0%	47.7%	100.0%
Salem	325	41.8%	8.6%	49.5%	100.0%
SJTPO Total	2604	43.4%	8.6%	48.0%	100.0%

Base: All household members age 16+, weighted.

A follow-up question was asked of all household members that were not employed, to determine their status. As shown in Table E-2, 69% of unemployed household members were retired. Cape May County had the highest percentage of retired people (78%), while Salem County had the lowest (62%). Cumberland County had the highest percentage of students (9%), while Atlantic had the lowest (4%).

Table E-2
Status if Not Employed

County	N	Retired	Homemaker	Unemployed		Student	Unknown	Total
				(seeking)	(not seeking)			
Atlantic	529	69.1%	12.5%	6.1%	3.4%	3.6%	5.3%	100.0%
Cape May	255	77.6%	9.0%	3.1%	2.7%	4.7%	2.8%	100.0%
Cumberland	306	67.2%	12.1%	5.2%	3.3%	8.5%	3.3%	100.0%
Salem	161	62.1%	19.9%	4.3%	4.3%	5.6%	3.7%	100.0%
SJ Total	1251	69.4%	12.6%	5.1%	3.4%	5.3%	4.2%	100.0%

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

Of those participating household members that reported they were employed, either part-time or full-time, the majority (92%) held one job. However, 8% reported having more than one job. Workers with more than one job were most likely found in Atlantic County (10%) than in Salem County (4%).

**Table E-3
Number of Jobs Held**

County	N	More Than One			Total
		Job	One Job	Unknown	
Atlantic	610	9.8%	90.0%	0.2%	100.0%
Cape May	244	8.6%	90.6%	0.8%	100.0%
Cumberland	335	5.7%	94.0%	0.3%	100.0%
Salem	164	4.3%	95.7%	0.0%	100.0%
SJTPO Total	1353	7.8%	91.9%	0.3%	100.0%

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

**Table E-4
Household Workers by Industry**

Industry	N	Household Workers			Total
		1	2	3+	
Agriculture / forestry / fishing	20	2.0%	1.1%	1.6%	1.5%
Mining	2	0.4%	0.0%	0.0%	0.1%
Utilities	34	3.5%	2.0%	2.1%	2.5%
Construction	85	7.7%	5.9%	4.3%	6.3%
Manufacturing (non-durable)	16	1.3%	1.0%	1.6%	1.2%
Manufacturing (durable)	25	1.1%	2.1%	2.7%	1.8%
Wholesale trade	15	1.8%	0.8%	0.5%	1.1%
Retail trade	99	6.1%	8.4%	5.9%	7.3%
Transportation and warehousing	47	3.9%	3.1%	3.7%	3.5%
Information	40	3.9%	2.5%	2.1%	3.0%
Finance or insurance	46	3.3%	3.9%	1.6%	3.4%
Real estate	16	1.1%	1.3%	1.1%	1.2%
Professional, scientific, technical	121	8.1%	9.7%	8.0%	8.9%
Management	54	4.2%	4.2%	2.7%	4.0%
Administrative/support	109	10.1%	7.0%	7.0%	8.0%
Educational services	117	7.9%	9.7%	6.4%	8.6%
Healthcare/social services	104	8.1%	7.7%	6.4%	7.7%
Arts, recreation, entertainment	86	7.4%	5.2%	8.0%	6.3%
Accommodations /food svcs	79	5.7%	5.8%	6.4%	5.8%
Other services	144	7.2%	10.4%	19.8%	10.6%
Public administration	56	2.8%	5.2%	3.2%	4.1%
Other	2	0.2%	0.1%	0.0%	0.1%
Don't know	13	0.4%	0.8%	2.7%	1.0%
Refused	25	1.8%	1.8%	2.1%	1.8%
Total	1355	100%	100%	100%	100%

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

d. Data on Primary Job

All respondents age 16 or older that were employed were asked a series of questions about their jobs. This included employer type, tenure at current job site, number of days worked and telecommuted instead of traveling to work, schedule, and whether vehicle was needed for work. In addition, questions about employer benefits for parking and transit usage were asked. Most workers were employed by private companies (61%). An additional 19% worked for the government, while 11% worked for a non-profit organization. Seven percent of participating household members were self-employed.

**Table W-1
Employer Type**

County	N	Private Co.	Government	Self-employed	Non-Profit	Refused	Total
Atlantic	610	63.4%	16.7%	6.7%	11.0%	2.2%	100.0%
Cape May	244	54.7%	22.4%	10.2%	9.0%	3.7%	100.0%
Cumberland	335	58.8%	23.0%	6.6%	9.9%	1.8%	100.0%
Salem	164	63.8%	14.7%	7.4%	14.1%	0.0%	100.0%
SJTPO Total	1353	60.8%	19.1%	7.3%	10.7%	2.1%	100.0%

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

Most employed respondents have worked at their current job sites for more than five years (57%). This was highest in Salem County (58%), and lowest in Cape May County (56%). Cumberland County respondents were most likely to have moved to new job sites in the past year (16% as compared to 12% overall).

**Table W-2
Tenure at Current Job Site**

County	N	Less than a			Refused	Total
		year	1 to 5 years	More than 5 years		
Atlantic	610	10.8%	29.9%	57.0%	2.3%	100.0%
Cape May	244	11.5%	29.1%	55.7%	3.7%	100.0%
Cumberland	335	15.9%	25.1%	56.6%	2.4%	100.0%
Salem	164	12.1%	28.5%	58.2%	1.2%	100.0%
SJTPO Total	1353	12.3%	28.4%	56.8%	2.5%	100.0%

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

Most workers work at least 5 days per week (73%). Atlantic County and Cape May County respondents were least likely to work this type of schedule, with 28% in each county reporting they worked less than five weekdays.

**Table W-3
Number of Days Worked**

County	N	Less than 5		Refused	Total
		days	5 days		
Atlantic	610	27.7%	69.5%	2.8%	100.0%
Cape May	244	28.2%	66.9%	4.9%	100.0%
Cumberland	335	15.3%	81.4%	3.3%	100.0%
Salem	164	18.4%	80.4%	1.2%	100.0%
SJTPO Total	1353	23.6%	73.3%	3.1%	100.0%

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

Most respondents reported telecommuting less than five days a week. As shown in Table W-4, 2% of respondents telecommute 5 days a week and an additional 2% telecommute more than 5 days a week. The majority (94%) telecommuted less than 5 days a week, if at all.

**Table W-4
Number of Days Telecommuted**

County	N	Less than 5 days	5 days	More than 5 days	Refused	Total
Atlantic	610	93.0%	2.3%	2.3%	2.5%	100.0%
Cape May	244	92.2%	1.2%	3.3%	3.3%	100.0%
Cumberland	335	95.2%	1.5%	2.1%	1.2%	100.0%
Salem	164	96.3%	1.2%	1.8%	0.6%	100.0%
SJTPO Total	1353	93.6%	1.8%	2.4%	2.1%	100.0%

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

The majority of respondents reported working regular, 40-hour work weeks (91%) while 8% reported working compressed schedules. There was little variation across the region in the type of work week reported.

**Table W-5
Compressed Work Week**

County	N	Work Compressed Schedule	Work Regular Schedule	Unknown	Total
Atlantic	610	8.7%	89.3%	2.0%	100.0%
Cape May	244	5.2%	92.3%	2.6%	100.0%
Cumberland	335	7.7%	91.2%	1.1%	100.0%
Salem	164	7.4%	92.6%	0.0%	100.0%
SJTPO Total	1353	7.7%	90.7%	1.5%	100.0%

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

Fifty-seven percent of employed respondents did not work on the weekend. However, 23% reported having to work at least one weekend day, while 19% reported having to work both Saturday and Sunday. Respondents in Cape May County were most likely to work on the weekend, with 25% reporting they worked one weekend day and 25% reporting they worked both weekend days.

**Table W-6
Work on Saturday or Sunday**

County	N	No Weekend Work	Work 1 Weekend Day	Work 2 Weekend Days	Unknown	Total
Atlantic	610	54.5%	21.2%	23.5%	0.9%	100.0%
Cape May	244	47.5%	25.0%	25.4%	2.0%	100.0%
Cumberland	335	63.2%	24.9%	12.0%	0.0%	100.0%
Salem	164	67.7%	20.7%	11.0%	0.6%	100.0%
SJTPO Total	1353	57.0%	22.7%	19.4%	0.9%	100.0%

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

Most employed respondents (72%) do not need their personal vehicles for work. However, 26% of respondents do need to use their vehicles for work purposes. Respondents in Salem Counties were most likely to need their vehicles (29%).

**Table W-7
Vehicle Needed for Work**

County	N	Need Vehicle for Work	Don't Need Vehicle	Unknown	Total
Atlantic	610	25.6%	72.0%	2.5%	100.0%
Cape May	244	27.9%	69.7%	2.4%	100.0%
Cumberland	335	24.8%	73.1%	2.1%	100.0%
Salem	164	29.1%	69.7%	1.2%	100.0%
SJTPO Total	1353	26.2%	71.6%	2.2%	100.0%

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

Employed respondents were asked if their employers provided subsidies for parking. As shown in Table W-8, only 18% of respondents responded affirmatively to the question. Respondents in Salem County were most likely to have employers who provided parking subsidies (22% compared to 18% overall).

**Table W-8
Employer Subsidies for Parking**

County	N	Yes	No	Unknown	Total
Atlantic	610	20.1%	74.7%	5.3%	100.0%
Cape May	244	12.3%	75.5%	12.3%	100.0%
Cumberland	335	17.6%	77.9%	4.6%	100.0%
Salem	164	22.2%	74.5%	3.3%	100.0%
SJTPO Total	1353	18.4%	75.7%	5.9%	100.0%

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

The majority of employed respondents indicated that they used (or would use if they drove) on-site parking at their job sites. Of those that did not park on-site, Atlantic County respondents were most likely to park off-site (10%) and Cape May respondents were most likely to park on the street (12%).

**Table W-9
Parking Location at Work**

County	N	On-Site	Off-Site	Street	Other	Total
Atlantic	610	73.9%	10.3%	8.3%	7.6%	100.0%
Cape May	244	75.6%	7.0%	11.7%	5.3%	100.0%
Cumberland	335	83.3%	4.2%	6.9%	5.7%	100.0%
Salem	164	87.5%	5.3%	5.3%	2.0%	100.0%
SJTPO Total	1353	78.1%	7.6%	8.2%	6.0%	100.0%

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

All employed respondents were also asked if their employer provided transit subsidies. As shown in Table W-10, most indicated their employers did not provide such subsidies. Atlantic County respondents were most likely to work for employers who did (9%).

**Table W-10
Employer Subsidies for Transit**

County	N	Yes	No	Unknown	Total
Atlantic	610	9.2%	82.9%	7.9%	100.0%
Cape May	244	5.4%	83.5%	11.1%	100.0%
Cumberland	335	7.8%	82.0%	10.2%	100.0%
Salem	164	7.1%	85.2%	7.7%	100.0%
SJTPO Total	1353	7.8%	83.1%	9.1%	100.0%

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

Despite the fact that most employed respondents indicated they worked five days a week (Table W-3), most respondents do not work a fixed schedule. As shown in Table W-11, 66% of respondents have schedules that vary by at least 15 minutes. Cape May respondents were most likely to work a constant schedule (36%).

**Table W-11
Schedule Type**

County	N	Constant	Varies	Unknown	Total
Atlantic	610	30.7%	66.7%	2.6%	100.0%
Cape May	244	36.1%	59.0%	4.9%	100.0%
Cumberland	335	27.8%	69.2%	3.0%	100.0%
Salem	164	31.3%	67.5%	1.2%	100.0%
SJTPO Total	1353	31.0%	66.1%	3.0%	100.0%

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

Even though the employed respondents work varying schedules, most reported work start times between the hours of 6 a.m. and 9 a.m. (62%). Twelve percent of respondents reported start times between 9 a.m. and 3 p.m., while 10% started before 6 a.m. Salem respondents were most likely to start work before 6 a.m. (13%), while Atlantic County respondents were more likely to start after 6 p.m. (10%).

**Table W-12
Work Start Times**

County	N	Before 6				Refused	Total	
		am	6 am - 9 am	9 am - 3 pm	3 pm - 6 pm			
Atlantic	610	8.9%	55.9%	14.4%	8.2%	9.5%	3.1%	100.0%
Cape May	244	9.4%	66.1%	8.2%	5.7%	4.9%	5.7%	100.0%
Cumberland	335	11.3%	65.4%	11.0%	4.5%	4.5%	3.3%	100.0%
Salem	164	12.8%	73.2%	7.9%	3.0%	1.2%	1.8%	100.0%
SJTPO Total	1353	10.1%	62.3%	11.6%	6.1%	6.4%	3.5%	100.0%

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

More than half of employed respondents (55%) reported their work days typically ended between 3 p.m. and 6 p.m. An additional 17% each reported ending work between the hours of 9 a.m. and 3 p.m. or after 6 p.m. As with work start times, Atlantic County respondents reported the greatest variety in work end times.

**Table W-13
Work End Times**

County	N	Before 6					Refused	Total
		am	6 am - 9 am	9 am - 3 pm	3 pm - 6 pm	After 6 pm		
Atlantic	610	6.7%	4.9%	15.1%	49.6%	20.2%	34%	100.0%
Cape May	244	2.4%	3.3%	18.8%	54.3%	15.1%	6.1%	100.0%
Cumberland	335	2.1%	2.7%	15.0%	62.9%	13.8%	3.6%	100.0%
Salem	164	0.6%	1.2%	21.5%	59.5%	15.3%	1.8%	100.0%
SJTPO Total	1353	4.1%	3.7%	16.5%	54.8%	17.1%	3.8%	100.0%

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

e. Data on Secondary Job

All respondents who indicated they worked more than one job were asked to provide some details on their second job. Five data elements were collected for secondary job: employer type, number of days worked, number of days telecommuted, and typical start and end times. The data are displayed in the tables that follow. As with primary jobs, respondents with more than one job reported mostly working for private companies (58%). An additional 25% reported working a second job for government agencies. Salem County was most likely to have respondents who worked for themselves (self-employed) for their secondary jobs (29%).

**Table W-14
Secondary Job: Employer Type**

County	N	Self-					Total
		Private Co.	Government	employed	Non-Profit	Unknown	
Atlantic	60	71.2%	18.6%	10.2%	0.0%	0.0%	100.0%
Cape May	21	47.6%	38.1%	9.5%	4.8%	0.0%	100.0%
Cumberland	19	47.4%	31.6%	15.8%	0.0%	5.3%	100.0%
Salem	7	57.1%	14.3%	28.6%	0.0%	0.0%	100.0%
SJTPO Total	106	58.2%	25.4%	13.9%	1.6%	0.8%	100.0%

Base: All employed household members age 16+ who reported having more than one job, weighted.

Most employed respondents worked less than five days a week at their second jobs (60%). Atlantic County respondents were most likely to work five days a week at their second jobs (24%), while Salem County respondents were most likely to work more than five days at their second jobs (29%).

**Table W-15
Secondary Job: Number of Days Worked**

County	N	Less than 5			More than 5		Total
		days	5 days	days	Unknown		
Atlantic	60	59.3%	23.7%	13.6%	3.4%	100.0%	
Cape May	21	70.0%	15.0%	10.0%	5.0%	100.0%	
Cumberland	19	61.1%	16.7%	16.7%	5.6%	100.0%	
Salem	7	42.9%	28.6%	28.6%	0.0%	100.0%	
SJTPO Total	106	60.4%	20.8%	15.1%	3.8%	100.0%	

Base: All employed household members age 16+ who reported having more than one job, weighted.

As shown in Table W-16, 93% of respondents reported that they telecommuted less than five days a week for their second jobs.

Table W-16
Secondary Job: Number of Days Telecommuted

County	N	Less than 5 days		More than 5 days	Total
			5 days		
Atlantic	60	94.7%	0.0%	5.3%	100.0%
Cape May	21	100.0%	0.0%	0.0%	100.0%
Cumberland	19	88.9%	0.0%	11.1%	100.0%
Salem	7	71.4%	0.0%	28.6%	100.0%
SJTPO Total	106	93.1%	0.0%	6.9%	100.0%

Base: All employed household members age 16+ who reported having more than one job, weighted.

The work start and end times showed more variety for those respondents with more than one job. As shown in Table W-17, 30% of respondents began their second jobs between the hours of 6 a.m. and 9 a.m. However, 26% started between 3 p.m. and 6 p.m.

Table W-17
Secondary Job: Typical Start Time

County	N	Before 6 am					Refused	Total
		6 - 9 am	9-3 pm	3 - 6 pm	After 6 pm			
Atlantic	60	8.6%	31.0%	8.6%	22.4%	19.0%	10.3%	100.0%
Cape May	21	9.5%	33.3%	14.3%	19.0%	19.0%	4.8%	100.0%
Cumberland	19	0.0%	27.8%	16.7%	38.9%	5.6%	11.1%	100.0%
Salem	7	14.3%	28.6%	28.6%	28.6%	0.0%	0.0%	100.0%
SJTPO Total	106	7.5%	30.2%	12.3%	25.5%	15.1%	9.4%	100.0%

Base: All employed household members age 16+ who reported having more than one job, weighted.

Most employed respondents with more than one job reported that they ended work at their second job after 6 p.m. (43%). Fourteen percent of Atlantic County respondents reported ending work before 6 a.m.

Table W-18
Secondary Job: Typical End Time

County	N	Before 6 am					Refused	Total
		6 - 9 am	9 - 3 pm	3 - 6 pm	After 6 pm			
Atlantic	60	13.6%	0.0%	18.6%	15.3%	40.7%	11.9%	100.0%
Cape May	21	0.0%	4.8%	14.3%	42.9%	33.3%	4.8%	100.0%
Cumberland	19	0.0%	5.6%	11.1%	16.7%	55.6%	11.1%	100.0%
Salem	7	0.0%	16.7%	0.0%	16.7%	66.7%	0.0%	100.0%
SJTPO Total	106	7.5%	2.8%	16.0%	20.8%	43.4%	9.4%	100.0%

Base: All employed household members age 16+ who reported having more than one job, weighted.

f. Person Trip Indicators

Table P-6
Average Person Trip Rates by Gender

Gender	N	Trip Rate
Male	1436	3.34
Female	1641	3.24
Total	3077	3.29

Base: All household members (n=3077), unweighted.

Table P-7
Average Person Trip Rates by Respondent Age

Respondent Age	N	Trip Rate
Less than 16	474	3.08
16 to 18	84	3.41
19 to 24	113	3.15
25 to 34	249	3.42
35 to 44	404	3.42
45 to 54	453	3.74
55 to 64	445	3.63
65 or more	810	2.64
Refused	44	2.98
Total	3077	3.29

Base: All household members (n=3077), unweighted.

3.4 Vehicle Availability Results

The 1,460 South Jersey households reported having a total of 2,626 household vehicles available. The vehicle data collected for those vehicles is shown in the following tables, and includes: vehicle year, body type and ownership status. As shown in Table V-1, most respondents reported owning household vehicles built between 1990 and 1995 (35%). An additional 23% have vehicles built in 1996 through 1998. Salem County respondents had the highest proportion of pre-1990 vehicles (31%).

Table V-1
Distribution of Vehicle Age

County	N	Pre-1990	1990-1995	1996-1998	1999+	Unknown	Total
Atlantic	1082	24.3%	36.2%	25.1%	13.2%	1.1%	100.0%
Cape May	502	24.9%	32.5%	25.3%	16.5%	0.8%	100.0%
Cumberland	676	29.4%	36.7%	18.6%	14.1%	1.2%	100.0%
Salem	366	31.4%	33.9%	21.6%	11.5%	1.6%	100.0%
SJTPO Total	2626	26.7%	35.3%	23.0%	13.8%	1.1%	100.0%

Base: All household vehicles, weighted.

Most household vehicles reported by participating households were automobiles (62%). However, 36% of household vehicles were trucks or vans, while 2% were motorcycles and mopeds.

**Table V-2
Distribution of Vehicle Type**

County	N	Auto	Truck/Van/ SUV	Motorcycle/ Moped	Other	Total
Atlantic	1082	62.7%	34.0%	2.5%	0.8%	100.0%
Cape May	502	63.7%	35.1%	1.2%	0.0%	100.0%
Cumberland	676	61.0%	36.6%	1.5%	0.9%	100.0%
Salem	366	57.4%	38.3%	2.5%	1.9%	100.0%
SJTPO Total	2626	61.7%	35.5%	1.9%	0.8%	100.0%

Base: All household vehicles, weighted.

The majority of household vehicles were owned by the participating households. As shown in Table V-3, 96% of the household vehicles are owned, while 3% are employer-provided. Households in Cumberland County were most likely to have employer-provided vehicles (4%).

**Table V-3
Vehicle Ownership**

County	N	Owned	Employer Provided	Other	Total
Atlantic	1082	97.0%	1.7%	1.3%	100.0%
Cape May	502	97.4%	2.0%	0.6%	100.0%
Cumberland	676	94.2%	4.1%	1.6%	100.0%
Salem	366	96.2%	2.5%	1.4%	100.0%
SJTPO Total	2626	96.3%	2.5%	1.3%	100.0%

Base: All household vehicles, weighted.

**Table V-4
Distribution of Vehicle Make**

Vehicle Make	N	Percent
Ford	461	21.0%
Chevrolet	300	13.6%
Dodge	183	8.3%
Mercury	114	5.2%
Oldsmobile	108	4.9%
Buick	107	4.9%
Honda	102	4.7%
Toyota	91	4.1%
Pontiac	70	3.2%
Chrysler	65	3.0%
GMC	58	2.7%
Nissan	58	2.6%
Cadillac	51	2.3%
Lincoln	48	2.2%
Plymouth	48	2.2%
Jeep	46	2.1%
Volkswagon	29	1.3%
Saturn	29	1.3%
Hyundai	27	1.2%
Other	203	9.1%
Total	2197	100.0%

3.5 Travel Behavior Results

For the South Jersey Region, the 1,460 participating households reported data for 10,124 trips. The trip data includes type of place visited, activities at each place, travel modes, and number of people traveling together. For auto trips, data includes whether a household vehicle was used, parking locations, and whether tolls were paid. For trips made by transit, access and egress modes were recorded, as well as the number of transfers. The travel data is summarized in the following tables.

As shown in Table T-1, half of all reported trips were for the respondents to return home. Nine percent of reported locations visited were to a work location, while 3% were to school locations. The remaining trips were to a non-home, non-work, and non-school location.

Table T-1
Place of Activities by County

County	N	Home	Work	School	Other	Out of Area	Total
Atlantic	5804	49.9%	9.0%	3.2%	37.2%	0.7%	100.0%
Cape May	2442	50.6%	7.9%	2.6%	38.5%	0.4%	100.0%
Cumberland	3237	51.2%	9.1%	4.6%	34.0%	1.1%	100.0%
Salem	1719	50.2%	7.5%	3.4%	35.0%	4.0%	100.0%
SJTPO Total	13201	50.4%	8.7%	3.4%	36.3%	1.2%	100.0%

Base: All places visited, weighted.

Twenty percent of all activities reported were for family or personal business, while 18% were for sleeping and 13% for eating. The distribution of activities was fairly uniform across the region.

Table T-2
Major Activities Reported by County

County	N	Work	School	Family/ Personal	Eat	Sleep	Other	Total
Atlantic	5804	11.5%	3.3%	19.9%	12.6%	17.4%	35.4%	100.0%
Cape May	2442	10.1%	3.0%	23.4%	14.1%	15.6%	33.7%	100.0%
Cumberland	3237	10.3%	4.9%	18.1%	12.3%	19.0%	35.4%	100.0%
Salem	1719	10.4%	3.7%	20.2%	10.9%	19.0%	35.8%	100.0%
SJTPO Total	13201	10.8%	3.7%	20.1%	12.6%	17.7%	35.1%	100.0%

Base: All places visited, weighted.

All reported activities at all places visited (including the anchor Place 1) are shown in Table T-3. The most frequently reported activity was sleeping, followed by eating.

Table T-3
Reported Activities at All Places Visited

Activity	Frequency	Percent
Eat meals	5513	22.8%
Sleep	4683	19.3%
Social/recreation	1746	7.2%
Other personal/family business	1382	5.7%
All other shopping	1275	5.3%
Work at regular jobsite	1163	4.8%
Drop-off / pick-up someone	840	3.5%
Visit	586	2.4%
School at regular place	463	1.9%
Work at other place	270	1.1%
Doctor/dentist	228	0.9%
Religious / civic	167	0.7%
School at other place	75	0.3%
Work at home	60	0.2%
Internet shopping	18	0.1%
Other in-home activities	5643	23.3%
Other out-of-home activities	96	0.4%

Base: All reported activities (n=24,206– multiple response allowed). (Includes all activities reported at all places, including Place 1), weighted.

Table T-4
Distribution of Trip Purposes

Activity	Frequency	Percent
Eat meals	3407	20.8%
Sleep	9593	12.1%
Social/recreation	1482	9.0%
All other shopping	1274	7.8%
Other personal/family business	3779	7.3%
Work at regular jobsite	1122	6.8%
Drop-off / pick-up someone	839	5.1%
Visit	543	3.3%
School at regular place	455	2.8%
Work at other place	268	1.6%
Doctor/dentist	223	1.4%
Religious / civic	162	1.0%
School at other place	73	0.4%
Activities at home (work, shop, other)	5204	31.7%
Other	96	0.6%

Base: All trip-related activities (n=16402– multiple response allowed). (Excludes all activities reported at Place 1).

Most reported trips were made by auto (85%). This included auto driver, auto passenger, or motorcycle. However, 2% of Atlantic County trips were by transit. Trips by walking or bicycle were more likely made by respondents in Atlantic and Cape May counties.

**Table T-5
Major Travel Modes by County**

County	N	Auto	Transit	Walk	Bike	Other	Total
Atlantic	4515	82.6%	3.4%	9.2%	0.7%	4.0%	100.0%
Cape May	1875	85.2%	1.3%	6.7%	2.3%	4.5%	100.0%
Cumberland	2467	86.5%	0.3%	5.3%	0.4%	7.6%	100.0%
Salem	1334	90.1%	0.5%	4.7%	0.6%	4.1%	100.0%
SJTPO Total	10193	85.0%	1.9%	7.2%	0.9%	5.0%	100.0%

Base: All trips, weighted.

**Table T-6
Detailed Mode Usage by County of Residence**

	Walk	Bike	Auto-D	Auto-P	Bus	School bus	Intercity Bus	Other
Atlantic	9.2%	0.7%	64.0%	18.6%	3.4%	3.2%		0.9%
Cape May	6.7%	2.3%	65.9%	19.2%	1.3%	3.1%		1.4%
Cumberland	5.3%	0.4%	65.2%	21.3%	0.3%	6.8%		0.8%
Salem	4.7%	0.6%	68.3%	21.8%	0.5%	3.7%		0.5%
SJTPO	7.2%	0.9%	65.2%	19.8%	1.9%	4.1%		0.9%

*Blank cells indicate no observations.

*Percentages reflect all modes reported for any given trip.

**Table T-7
Distribution of Travel Modes**

Travel Mode	Frequency	Percent	Duration (minutes)
Auto driver	6644	65.2%	18.85
Auto passenger	2018	19.8%	19.97
Walk	735	7.2%	13.48
School Bus	419	4.1%	26.34
Bus	141	1.4%	42.42
Bicycle	92	0.9%	15.61
Shared ride	42	0.4%	27.41
Amtrak, other railroad	10	0.1%	62.42
Commuter van/shuttle	10	0.1%	33.55
Charter bus	8	0.1%	105.19
Commuter rail	5	0.0%	65.00
Subway/elevated rail	2	0.0%	54.14
Trolley	0	0.0%	--
Other	67	0.7%	22.43
Total	10193	100.0%	506.81

Base: All reported travel modes (multiple response allowed), weighted.

**Table T-8
Reported Trip Durations**

Trip Duration	Frequency	Percent
5 minutes or less	2588	25.6%
6 to 10 minutes	2048	20.2%
11 to 15 minutes	1905	18.8%
16 to 20 minutes	906	8.9%
21 to 25 minutes	414	4.1%
26 to 30 minutes	983	9.7%
31 to 35 minutes	205	2.0%
36 to 40 minutes	180	1.8%
41 to 45 minutes	235	2.3%
46 to 50 minutes	64	0.6%
51 to 55 minutes	49	0.5%
56 to 60 minutes	197	1.9%
61 to 65 minutes	31	0.3%
66 to 70 minutes	28	0.3%
71 to 75 minutes	47	0.5%
76 to 80 minutes	21	0.2%
81 to 85 minutes	8	0.1%
More than 85 minutes	215	2.1%

Base: All trips.

All respondents who reported making a trip by auto (driver, passenger, or motorcycle) were asked how many traveled in their party. More than half of all reported trips were made by only one person (57%). However, 28% of trips were made by two people traveling together.

**Table T-9
Number Traveling Together on Auto Trips**

County	N	1	2	3	4+	Total
Atlantic	3728	57.3%	26.7%	9.5%	6.5%	100.0%
Cape May	1597	58.0%	28.4%	9.3%	4.3%	100.0%
Cumberland	2132	55.4%	27.8%	9.8%	7.1%	100.0%
Salem	1202	56.3%	29.9%	8.4%	5.4%	100.0%
SJTPO Total	8660	56.8%	27.7%	9.4%	6.1%	100.0%

Base: All trips, weighted.

The majority of auto trips were made by using household vehicles (93%). Atlantic County respondents were most likely to travel in a non-household vehicle (8% as compared to 7% overall).

**Table T-10
Household Vehicle Used**

County	N	Yes	No	Total
Atlantic	3728	92.4%	7.6%	100.0%
Cape May	1597	93.5%	6.5%	100.0%
Cumberland	2132	93.4%	6.6%	100.0%
Salem	1202	95.2%	4.8%	100.0%
SJTPO Total	8660	93.3%	6.7%	100.0%

Base: All auto trips, weighted.

All reported auto trips gathered information on the parking location at the trip destinations. As shown in Table T-11, half of all auto trips resulted in parking in a lot at the trip destination (50%). An additional 36% of auto trips resulted in parking in driveways. Cape May respondents making auto trips were most likely to park on the street (10% vs. 7% overall).

**Table T-11
Parking Type**

County	N	Street	Garage	Parking lot	Driveway	Didn't Park	Other	Total
Atlantic	3728	8.2%	1.7%	48.9%	35.8%	5.4%	0.1%	100.0%
Cape May	1597	10.0%	1.9%	50.6%	33.7%	3.9%	0.0%	100.0%
Cumberland	2132	4.4%	1.7%	49.8%	37.5%	6.4%	0.1%	100.0%
Salem	1202	4.5%	1.5%	50.8%	36.9%	5.9%	0.3%	100.0%
SJTPO Total	8660	7.0%	1.7%	49.6%	36.3%	5.3%	0.1%	100.0%

Base: All auto trips, weighted.

Each time a respondent reported making a trip by auto, a follow-up question asked whether a toll was paid for that trip. The majority of auto trips did not involve toll payments (96%). Cape May respondents making auto trips were most likely to report toll payments.

**Table T-12
Tolls Paid by Auto Drivers**

County	N	Yes	No	Total
Atlantic	4161	4.0%	96.0%	100.0%
Cape May	1836	8.8%	91.2%	100.0%
Cumberland	2458	1.1%	98.9%	100.0%
Salem	1375	3.6%	96.4%	100.0%
SJTPO Total	9831	4.1%	95.1%	100.0%

Base: All auto trips, weighted.

Respondents who reported making transit trips were asked about their access and egress modes, as well as how many transfers they made. As shown in Table T-13, most transit trips began with a walk trip (85%). However, in Salem County, respondents making transit trips reported less walk access and more driving (either parking or dropped off) to access transit.

**Table T-13
Access Mode of Transit Riders**

County	N	Walk	Drove & parked	Dropped off	Rode bike	Other	Total
Atlantic	154	83.7%	5.9%	5.9%	0.7%	3.9%	100.0%
Cape May	24	88.0%	0.0%	12.0%	0.0%	0.0%	100.0%
Cumberland	10	90.0%	0.0%	10.0%	0.0%	0.0%	100.0%
Salem	8	75.0%	12.5%	12.5%	0.0%	0.0%	100.0%
SJTPO Total	196	84.6%	5.1%	6.7%	0.8%	0.9%	100.0%

Base: All transit trips, weighted.

Similarly, the overwhelming majority of transit trips ended by the respondents walking to their ultimate destinations (93%). Again, Salem County respondents making transit trips were more likely to take parked cars than respondents in any other county.

Table T-14
Egress Mode of Transit Riders

County	N	Drove					Total
		Walk	Parked Car	Picked Up	Rode bike	Other	
Atlantic	154	92.1%	2.0%	1.3%	0.7%	4.0%	100.0%
Cape May	24	100.0%	0.0%	0.0%	0.0%	0.0%	100.0%
Cumberland	10	90.0%	0.0%	0.0%	10.0%	0.0%	100.0%
Salem	8	87.5%	12.5%	0.0%	0.0%	0.0%	100.0%
SJTPO Total	196	92.8%	2.1%	1.0%	1.0%	3.1%	100.0%

Base: All transit trips, weighted.

The majority of transit trips were accomplished in one segment, as 87% of the reported transit trips involved no transfers. Respondents in Cape May County were most likely to make one transfer (13%), while those in Atlantic County were most likely to make transit trips with multiple transfers involved.

Table T-15
Number of Transfers Made by Transit Riders

County	N	None	1	2	3+	Total
Atlantic	154	86.4%	5.8%	4.5%	3.2%	100.0%
Cape May	24	87.5%	12.5%	0.0%	0.0%	100.0%
Cumberland	10	90.0%	10.0%	0.0%	0.0%	100.0%
Salem	8	100.0%	0.0%	0.0%	0.0%	100.0%
SJTPO Total	196	87.2%	6.6%	3.6%	2.6%	100.0%

Base: All transit trips, weighted.

4. SURVEY EXPANSION AND TRAVEL RESULTS

The survey results in the previous section show the depth and breadth of information collected as part of the Transportation for the 21st Century Household Travel Survey. The results were a straightforward presentation of data based on the 1,460 households in the South Jersey region. These households were randomly selected to represent the 193,891 households that comprise the survey universe for the South Jersey region. The purpose of this section is to expand the results of the 1,460 households so that they can be used to approximate the 193,891 regional households, then to report the expanded data.

4.1 Expansion Calculations

The creation of an expansion factor for the South Jersey households is comprised of two elements that aim to expand the survey data from the 1,460 households to the 193,891 regional households that they represent. This is accomplished through two straightforward calculations.

Specifically, the weighted distribution of the 1,460 households takes into account the probability of selection. As detailed in Chapter 3, the weights also adjust the distribution of households by county and household availability so that the distribution is proportionate to the universe. Therefore, the calculation of expansion factors is a two-step process.

a. Calculation of expansion number

There are 193,891 households in the survey universe. Of these, 1,460 were surveyed as part of this project. Therefore, each surveyed household represents 132.8021 universe households. This was determined by dividing the number of universe households by the number of households in the sample. This number becomes FACTOR6 and is attached to each household record.

b. Calculation of expansion factor

FACTOR6 is then multiplied by the unique weight created for each household, as detailed in Chapter 3. The multiplication is necessary to keep the households in relative proportion with each other. The result of this multiplication is the expansion factor, EXPFACT. The results of the expansion factor are shown in the following tables. Specifically, the distribution of households by county and household vehicle availability is shown in Table 4-1, while the corresponding distribution of universe households is shown in Table 4-2. The expanded survey data are shown in Table 4-3.

Table 4-1
Distribution of Surveyed Households by County

County	0-vehicles	1-vehicle	2-vehicles	3+-vehicles	Total
Atlantic	48	135	164	82	429
Cape May	19	111	131	71	332
Cumberland	16	110	154	83	363
Salem	14	87	139	96	336
Total	97	443	588	332	1460

**Table 4-2
Distribution of Universe Households by County**

County	0-vehicles	1-vehicle	2-vehicles	3+-vehicles	Total
Atlantic	14213	30304	29818	10788	85123
Cape May	3969	16019	13354	4514	37856
Cumberland	5775	16826	17294	7223	47118
Salem	2304	8047	9732	3711	23794
Total	26261	71196	70198	26236	193891

**Table 4-3
Expanded Survey Data Set**

County	0-vehicles	1-vehicle	2-vehicles	3+-vehicles	Total
Atlantic	15546	31187	29581	9119	85433
Cape May	4082	16978	12573	3932	37565
Cumberland	6125	17973	16869	6191	47158
Salem	2632	8422	9347	3383	23784
Total	28385	74560	68370	22625	193940

The expansion factors in Table 4-3 are applied to the data by multiplying them against the weight factors developed and documented in Section 3.1 of this report. A slight adjustment is required to have the expanded households equal the actual number in the universe

4.2 Survey Data Expanded

The expansion factors created in the previous section were applied to the survey data. The results are shown in the following tables. Specifically, the expanded household results are compared to 1997 DVRPC estimates for the number of households. Table 4-4 shows the distribution of surveyed households, expanded to reflect the universe, and the 1997 DVRPC household estimates. Since the DVRPC estimates were used to create the expansion factors (with the distribution of household vehicle availability based on the 1990 Census distribution), the distributions in Table 4-4 are almost exactly the same.

**Table 4-4
Household Estimates by County**

County	Expanded Survey	
	Results	DVRPC Estimates
Atlantic	85,433	85,123
Cape May	37,565	37,856
Cumberland	47,158	47,118
Salem	23,784	23,794
SJTPO Total	193,940	193,891

SJTPO adopted County Demographic Forecasts for population and employment in May 2000, and updated them in December 2000. The following tables compare the expanded survey data with the SJTPO forecasts. The expanded survey data reflects a lower population than the SJTPO population estimates for the year 2000. As shown in Table 4-5, the survey data accounts for 74% of the SJTPO estimates by county.

**Table 4-5
Population Estimates by County**

County	Survey Population	SJTPO Population	% difference
Atlantic	177,642	241,542	73.5%
Cape May	75,534	104,527	72.3%
Cumberland	103,987	141,084	73.7%
Salem	51,513	64,985	79.3%
SJTPO Total	408,676	552,138	74.0%

As indicated earlier, the 1,460 participating South Jersey households reported data for 10,124 trips. When expanded, these 10,124 trips become 1,344,474 trips. Of these trips, 241,674 are home-based work trips, 740,162 are home-based other trips, and 362,638 are non-home based trips.

**Table 4-6
Total Trips by Trip Purpose**

County	Number of Household Trips	Home-based Work Trips	Home-based other Trips	Non-home based Trips
Atlantic	593,077	112,337	319,216	161,523
Cape May	248,775	41,188	141,045	66,543
Cumberland	325,846	57,753	181,033	87,060
Salem	176,777	30,396	98,868	47,513
SJTPO Total	1,344,475	241,674	740,162	362,639

As shown in Table 4-7, these 1,344,474 regional trips are comprised mostly of 1,240,966 motorized trips. The remaining 103,508 trips were made by non-motorized means of transportation.

**Table 4-7
Total Trips by Mode**

County	Number of Household Trips	Motorized Trips	Non-motorized Trips
Atlantic	593,077	538,178	54,898
Cape May	248,775	226,541	22,234
Cumberland	325,846	308,693	17,153
Salem	176,777	167,554	9,223
SJTPO Total	1,344,474	1,240,966	103,508

5. EVALUATION OF SURVEY RESULTS

The purpose of the Transportation for the 21st Century Household Travel Survey was to provide data for continuing development and refinement of the Regional Travel Demand Forecasting Model, as well as to provide a better understanding of travel behavior in the Delaware Valley and South Jersey regions. The study area consisted of the Pennsylvania counties of Bucks, Chester, Delaware, Montgomery, and Philadelphia (along with a small portion of Berks County); the New Jersey Delaware Valley counties of Burlington, Camden, Gloucester, and Mercer; and the South Jersey counties of Atlantic, Cape May, Cumberland, and Salem.

A total of 7,540 households were recruited to participate in the study. Of these, 5,677 households (75%) completed travel diaries (the information was gathered from all household members regardless of age). The 5,677 households represent 13,830 persons, 10,570 vehicles, and 48,646 trips across all counties surveyed.

For the Delaware Valley region, there were 5,579 recruited households, of which 4,217 completed the study (76%). These 4,217 households included data for 10,391 persons, 7,750 vehicles, and 36,680 trips. In South Jersey, 1,961 households were recruited and 1,460 completed the study (74%). This included data on 3,439 persons, 2,820 vehicles and 11,966 trips. The purpose of this report is to document the methods used to conduct the Transportation for the 21st Century Household Travel Survey, as well as to present survey results.

The overall response rate for the study was 32% - this was comprised of a 43% recruitment rates and a 75% retrieval rate. This means that 32% of all eligible households that were contacted actually completed the study. The overall response rate for the Delaware Valley region was 34% (45% recruitment rate and 76% retrieval rate). In South Jersey, the overall response rate was 30% (recruitment rate of 41% and 72% retrieval rate). The response rates achieved in this study compare favorably with those of other recent household travel surveys conducted using similar methodology.

Data at the person, vehicle, and trip levels were also summarized and presented as part of this report. Data tables were run for all study variables and categorized by county. The resultant data set provides a rich source of information about travel in the Delaware Valley region and will serve as a solid foundation for regional model update efforts.

The following is an evaluation of the final data set performed by Cambridge Systematics:

As previously stated, the Transportation for the 21st Century Household Travel Survey was conducted to help understand the travel behavior of the region and to provide input information for future travel demand model development. As part of this effort, Cambridge Systematics reviewed the final survey data sets to ensure their usefulness for future model development. The primary conclusion was that the databases and documentation provided to DVRPC and SJTPO will be extremely useful in future model development efforts. It is clear that:

- a. The databases were very clean compared to other household data sets and the code books accurate and understandable;
- b. The percentage of geocoded trip ends was very high and a visual review of the geocoded addresses by Cambridge Systematics found no problems;

- c. The collected data includes the variables and geographic breadth to allow analysts to compare and combine it with 2000 Census data as that becomes available, using several alternative strategies;
- d. The analysis of survey data and the comparison results with national estimates of trip-making behavior indicate that the survey results appear to be very reasonable. These analyses are described below, along with the associated tables.

Table 5-1 shows trip weights derived from weighted survey data. The relative magnitudes of the rates appear to be quite reasonable and consistent with other high quality data sets.

**Table 5-1
Household Survey Daily Trip Rates by Trip Purpose (All Modes)**

Classification	Households in Survey	Home-Based Work Trip Rate	Home-Based Other Trip Rate	Non-home Based Trip Rate	Total Trip Rate
Total	1460	1.25	3.82	1.87	6.93
1-person	502	0.44	1.66	1.01	3.10
2-person	594	1.26	3.21	1.70	6.17
3-person	168	2.12	5.68	3.12	10.91
4-person	117	2.56	7.78	2.90	13.24
5+ person	78	2.53	12.28	4.48	19.30
0-vehicle	214	0.40	2.08	0.75	3.23
1-vehicle	561	0.73	3.05	1.37	5.15
2-vehicle	515	1.71	4.78	2.51	9.00
3+ vehicle	170	2.60	5.58	3.01	11.19
0-worker	590	0.00	3.06	1.08	4.18
1-worker	458	1.27	3.57	2.02	6.86
2+-workers	413	2.95	5.17	2.83	10.95

Base: All households, weighted.

Table 5-2 shows the trip rates for motorized trips (auto and transit). As one would expect, the biggest differences among all the trip rates are for the zero vehicle households. The rates for motorized trips appear to have reasonable relative magnitudes.

**Table 5-2
Household Survey Daily Trip Rates by Trip Purpose (Motorized Modes)**

Household Classification	Households in Survey	Home-Based Work Trip Rate	Home-Based Other Trip Rate	Non-home Based Trip Rate	Total Trip Rate
Total	1460	0.97	3.65	1.78	6.40
1-person	502	0.34	1.59	0.93	2.86
2-person	594	0.95	3.23	1.60	5.78
3-person	168	1.69	5.40	3.00	10.09
4+-person	195	2.05	8.70	3.45	14.19
0-vehicle	214	0.13	1.11	0.58	1.81
1-vehicle	561	0.56	2.92	1.31	4.79
2-vehicles	515	1.37	4.81	2.41	8.59
3+ vehicles	170	2.18	5.71	2.93	10.82
0-worker	590	0.00	2.64	1.03	3.66
1-worker	458	0.95	3.52	1.91	6.37
2+-workers	413	2.39	5.23	2.72	10.33

Base: All households, weighted.

Table 5-3 compares the household survey results to information provided in NCHRP Report #365, a source of national “rules-of-thumb” for modeling analyses.

Table 5-3
Comparison of Household Survey Daily Motorized Trip Rates to NCHRP 365

	Home-Based Work Trip Rate	Home-Based Other Trip Rate	Non-home Based Trip Rate	Total Trip Rate
SJTPO				
Daily Rate	0.97	3.65	1.78	6.40
Percent of Trips	15%	57%	28%	100%
NCHRP 365				
Daily Rate	1.80	4.80	2.00	8.50
Percent of Trips	21%	56%	23%	100%

Base: All households, weighted.

As Table 5-4 shows, the SJTPO trip rates are slightly lower than the NCHRP rates, with the biggest difference occurring for smaller households and zero vehicle households. Since some rates are higher, and others lower, there does not appear to be any systematic problem with the SJTPO rates.

Table 5-4
Comparison of Household Survey Daily Trip Rates to NCHRP Trip Rates

Classification	Households in Survey	Survey Total Trip Rate	NCHRP Total Trip Rate
One person households	502	3.10	4.2
Two person households	594	6.17	7.3
Three person households	168	10.91	9.3
Four person households	117	13.24	12.0
Five + person households	78	19.30	14.8
Total	1460	6.93	
Zero vehicle households	214	3.23	4.1
One vehicle households	561	5.15	6.3
Two vehicle households	515	9.00	9.7
Three + vehicle households	170	11.19	11.8
Total	1460	6.93	

Base: All households, weighted.

Table 5-5 shows the mode shares of the reported trips from the household survey. The shares are in general agreement with similar measures from elsewhere. The walk share of 7% is slightly lower than the NPTS average of about 10% for large metropolitan areas, but not significantly so.

**Table 5-5
Travel Modes**

Travel Mode	Frequency	Percent
Auto driver	6644	65.2%
Auto passenger	2018	19.8%
Walk	735	7.2%
School Bus	419	4.1%
Bus	141	1.4%
Bicycle	92	0.9%
Subway/elevated rail	2	0.0%
Commuter rail	5	0.0%
Shared ride	42	0.4%
Amtrak, other railroad	10	0.1%
Commuter van/shuttle	10	0.1%
Charter bus	14	0.1%
Other	61	0.6%
Total	10193	100.0%

Base: All reported travel modes, weighted.

Table 5-6 shows the distribution of reported trip times. It is likely that network trip times will be assigned to the database for modeling purposes, but the general shape of the reported travel time distribution does show that a significant number of shorter trips were captured in the survey. Underreporting of shorter trips is common for diary surveys.

**Table 5-6
Reported Trip Durations**

Trip Duration	Frequency	Percent
5 minutes or less	2588	25.6%
6 to 10 minutes	2048	20.2%
11 to 15 minutes	1905	18.8%
16 to 20 minutes	906	8.9%
21 to 25 minutes	414	4.1%
26 to 30 minutes	983	9.7%
31 to 35 minutes	205	2.0%
36 to 40 minutes	180	1.8%
41 to 45 minutes	235	2.3%
46 to 50 minutes	64	0.6%
51 to 55 minutes	49	0.5%
56 to 60 minutes	197	1.9%
61 to 65 minutes	31	0.3%
66 to 70 minutes	28	0.3%
71 to 75 minutes	47	0.5%
76 to 80 minutes	21	0.2%
81 to 85 minutes	8	0.1%
More than 85 minutes	215	2.1%
Total	10124	100%

Base: All trips.

CONCLUSION

The data set produced as a result of the Transportation for the 21st Century Household Travel Survey represents an excellent source of regional travel behavior information for the transportation planning community. The project scope along with careful survey design and execution have provided a high quality data set for use in regional transportation planning and future modeling and travel forecasting efforts. As indicated by Cambridge Systematics review of the final data set, as well as the tables and summaries presented throughout this report, the Transportation for the 21st Century data set will serve as a solid foundation for regional model update efforts.