MID-AMERICA REGIONAL COUNCIL

KANSAS CITY REGIONAL HOUSEHOLD TRAVEL SURVEY

Final Report

NuStats

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INTRODUCTION

This report documents the design, implementation and results of the 2004 Kansas City Regional Household Travel Survey, sponsored by the Mid-America Regional Council (MARC), and the Kansas and Missouri Departments of Transportation. The primary objective of the study was to document travel behavior data characteristics of regional households in order to update the regional transportation model.

The household travel survey was conducted using standard travel survey methods and computer-aided telephone interviewing (CATI) technology. It entailed the collection of activity and travel information for all household members regardless of age during a specific 24-hour period. The survey relied on the willingness of regional households to (1) provide demographic information about the household, its members and its vehicles and (2) have all household members record all travel and activity for a specific 24-hour period, including address information for all locations visited, trip purpose, mode, and travel times. No incentives were provided to respondents, although an extensive public information campaign was used at the start of the project to emphasize the importance of and benefits from participating.

This study included a technology supplement that involved equipping a subsample of household vehicles with global positioning systems (GPS). The objectives of the GPS component were twofold: (1) to provide an independent data stream of vehicular travel in order to measure the level of accuracy of the travel data reported over the telephone and (2) to obtain details about those trips that were captured by GPS but not reported over the telephone, in order to derive a trip correction factor.

Survey work began with design activities in October 2003, followed by a pilot study in November 2003. The full study ran from January 19 through May 19, 2004. In total, 4,001 households were recruited to participate in the study and 3,049 provided travel data. The overall response rate, calculated according to standards established by the Council of American Survey Research Organizations, was 35% (this included a 46% recruitment rate and a 76% retrieval rate).

The household travel survey was conducted by a team of consultants, led by NuStats. NuStats designed the survey, managed data collection, processed and geocoded the data, provided quality control and assurance, analyzed the survey data, and created the weighting, expansion, and trip correction factors. NuStats' DataSource conducted the telephone interviews and mailed the travel log packets. GeoStats fielded the GPS survey supplement and prompted-recall survey. PB Consult provided modeling advice to MARC regarding the data items, final data set content and preliminary model specifications. Finally, Airick West and Associates provided material review consultation.

This report has five sections: this introduction, methods, results, comparison of results to the 1990 survey, and conclusions. The appendices contain the survey materials and questionnaires, as well as a frequency of unweighted responses to both the recruitment and the retrieval questionnaires. The focus of this report is on the general household travel survey. A second report contains a detailed discussion of the GPS component methods, results, and calculation of a trip correction factor.

SURVEY METHODS

The Kansas City Regional Household Travel Study was a comprehensive survey of the travel patterns of Kansas City regional households in the spring of 2004. The survey universe was defined as all households residing within the seven-county Kansas City metropolitan region, which included Johnson, Leavenworth, and Wyandotte Counties in Kansas and Cass, Clay, Jackson, and Platte Counties in Missouri. Eligible households included those English and Spanish speaking households residing in the Kansas City region that provided a valid home address, information about their households and vehicles, and ultimately provided the detailed 24-hour travel data. The goal of the study was to document demographic and travel behavior characteristics for a minimum of 3,000 regional households. This goal was achieved and the final data set contains demographic and trip information for 3,049 Kansas City households.

The survey was conducted over a ten-month period, from October 2003 through May 2004. The general progression of the project began in October 2003 with the design stage, where the data elements to support modeling and other desired analyses were identified and used to craft the recruitment and retrieval questionnaires as well as the 24-hour travel log provided to respondents to record their travel. At the same time that consideration was given to what would be collected, equal attention was given to who would be surveyed. This information was used to formalize a sampling plan that would provide sufficient samples in desired proportions to support sub-regional modeling.

Once the design work was completed, a pilot test was conducted in November 2003 to assess respondent reaction to the survey and to confirm that the survey questions would yield the desired data. The pilot test included two components: (1) a pretest of the instruments and respondent materials, data collection and data processing activities, and GPS deployment procedures and (2) focus group testing of the instruments and respondent materials with minority populations that tend to be under-represented in household travel surveys. The results of the pilot test were used to revise the questionnaires, materials, and procedures for data collection, processing, and GPS deployment.

The full study data collection activities began January 19, 2004, with travel dates assigned from Monday, February 2 through Friday, May 14, 2004. As the travel data were collected, they were processed and geocoded as well as subjected to a series of quality assurance tests. The final tasks included (1) the creation of weighting factors that would adjust the data with regard to geographic and demographic distribution and expansion factors to magnify the survey results to the study area population, (2) an analysis of the survey results and development of specifications to guide the modeling process (documented in Appendix A), and (3) a comparison of the trips reported by respondents over the telephone versus those detected by the GPS equipment and the development of trip correction factors (documented in a separate report).

This section of the report provides details about the methodology used to conduct the survey through the stages described above. It concludes with documentation on the development of the weights and expansion factors for use with the final data set. Within each section, the methods used as well as the outcomes from those methods are discussed.

SURVEY DESIGN

The study began with a series of meetings to discuss the desired approach that the regional travel demand modeling effort would employ and to identify the data needs that would satisfy the modeling requirements and analysis plans that would be based on the survey data. This resulted in the identification of the following variables (listed based on their location in the final data files):

TABLE 1: HOUSEHOLD SURVEY DATA ITEMS

HOUSEHOLD DATA FILE	PERSON DATA FILE	VEHICLE DATA FILE	TRIP DATA FILE
For each household:	For each HH member:	For each HH vehicle:	For each person trip
HH Size	Relationship	Year	Destination Address
HH Vehicles	Gender	Make	Land Use Type
HH Workers	Age	Model	Departure Time
HH Students	Licensed Driver	Fuel Type	Arrival Time
Dwelling Type	Employment Status	Body Type	Trip Purpose
Own/Rent Status	Status if not Employed		Trip Duration
Tenure at Current Residence	Employment Category		Activity Duration
HH Income	Work Address		Mode
Ethnicity	Work Land Use		HH Vehicle Used
Bike usage last summer	Typical Mode to Work		Vehicle Occupancy
Bike usage this summer	Work Parking Location		Transit Transfers
Travel Date	Work Parking Cost		Transit Access Distance
Travel Day of Week	Educational Attainment		Transit Egress Distance
# HH Trips	Student Status		
GPS Data Available	Type of School		
Importance of transportation infrastructure components			
Rating of transportation infrastructure components			

Once the data elements were selected, the recruitment and retrieval questionnaires were developed along with supporting respondent materials. The recruitment instrument was used to obtain the household demographic characteristics, while the retrieval questionnaire was designed to collect the travel details. The main respondent instrument was a travel log, which was designed as a self-completion tool to help respondents remember places visited and exact arrival and departure times. Copies of these instruments are contained in the report appendices.

SAMPLE DESIGN

Equally important as the decision of what to obtain during the survey is from whom to obtain that data. In order to provide a data set representative of the region's population and travel patterns, it was necessary to design a study sample that would provide adequate representation of households by geography as well as the key demographics of household size and household vehicles. The main objectives of the sample design were:

- To produce a statistically adequate number of observations at a geographic level that meets MARC's modeling objectives;

- To produce data depicting the diverse travel behavior in the region; and

- To 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).

The general approach was that of a stratified probability sample that was randomly drawn proportionate to the number of households within each of the seven counties.[1] Since the sampling frame was a listing of all possible telephone numbers available to the region's households, households without telephones and households with only cellular numbers were excluded from the study. Other design parameters included the following:

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[1] A major requirement for probability-based samples is that the relative probability (or chance) of any given household being selected is known.

1. <u>Study Universe</u>: The seven-county Kansas City metropolitan region, including Johnson, Leavenworth, and Wyandotte Counties, Kansas and Cass, Clay, Jackson, and Platte Counties, Missouri.
2. <u>Survey Population</u>. English and Spanish-speaking households with in-home wired telephones residing within the study universe.[2]
3. <u>Sampling Frame</u>. The sampling frame (or the data base from which the sample was drawn) consisted of all telephone-owning households in the seven-county region.
4. <u>Target Number of Completes</u>: For the full study, the goal was to obtain travel data from 3,000 households.

The study goals were determined based on geographic and demographic characteristics of regional households. In terms of geography, the study area was divided into three geographic categories, based on densities: Stratum 1 was the urban core with the highest densities, Stratum 2 represented the first suburban ring with slightly lower densities, and Stratum 3 included the remainder of the area. Households were assigned to a particular geographic stratum based on the census tract of residence. The demographic characteristics were household size and vehicle availability. Table 2 shows the desired, actual, and proportionate distribution of sampled households.

As shown in Table 2, the study includes households from throughout the seven-county region and in all combinations of household size and vehicle ownership. Of the 35 specific data collection goals listed in Table 2, the goals were achieved or exceeded in 15 of the cells, and within 10% of the actual goal in an additional 9 cells. For the remaining 11 cells, the data collection effort yielded less than expected, despite extensive targeted efforts. Those 11 cells included households with the following types of characteristics:

- Zero-vehicle households (strata 1 and 3)

- Households with more than one person but only one vehicle (stratum 1)

- Large households (3+ persons) but only one vehicle (strata 2 and 3)

- Large households (4+ persons) with more than 2 vehicles (stratum 2)

Data collection goals are developed to guide data collection. They are used to monitor household participation and to ensure that households more-than-willing to participate do not saturate the data set. At the same time, it is common to not fill all cells (i.e., to not exactly meet the data collection goal) due mainly to incidence and changes in population between the census year and the survey year.

The main reason that the data collection goals were not achieved for these particular household types was incidence – locating someone at home via the telephone. Except for the large households with more than 2 vehicles (stratum 2), the other households all exhibit characteristics associated with low-income households, which are known to have less stable telephone service characteristics. Thus, while the census data showed that there were a sufficient number of households with these traits living within the region and available for contact, a better data collection target would have been one that was based on telephone ownership as well as geography and household characteristics.

In terms of changes in composition of households in the Kansas City metropolitan area, the 0-vehicle household cells came close to being filled, but were not completely filled. This too is common, given the extreme dependence upon the automobile and the fact that minority and low-income households are acquiring vehicles at a faster rate then in the past. In the four years since the census was taken, it is very likely that household vehicle ownership has increased, which means the true number of 0-vehicle households in the region is lower than what census shows.

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[2] Census 2000 data indicated that about two percent of occupied housing units in the study area were without telephones. The proportion of cellular-only households was unavailable at the time this report was written.

STRATUM 1 - URBAN CORE	GOAL	ACTUAL	% ACHIEVED
1-person, 0-vehicle	64	57	89%
2+ persons, 0-vehicle	40	30	75%
1-person, 1-vehicle	154	160	104%
2-persons, 1-vehicle	61	52	85%
3-persons, 1-vehicle	31	22	71%
4+persons, 1-vehicle	34	22	65%
1-person, 2-vehicles	21	21	100%
2-persons, 2-vehicles	80	75	94%
3-persons, 2-vehicles	30	28	93%
4+persons, 2-vehicles	48	44	92%
all persons, 3+ vehicles	55	54	98%
Total - Stratum 1	618	565	91%
Stratum 2 - Suburbs (First Ring)			
all households w/ 0-vehicles	41	37	90%
1-person, 1-vehicle	174	190	109%
2-persons, 1-vehicle	70	68	97%
3-persons, 1-vehicle	28	24	86%
4+persons, 1-vehicle	26	16	62%
1-person, 2+ vehicles	37	44	119%
2-person, 2+ vehicles	195	218	112%
3-persons, 2-vehicles	55	58	105%
4+persons, 2-vehicles	74	67	91%
3-persons, 3+ vehicles	34	37	109%
4+ persons, 3+ vehicles	48	41	85%
Total - Stratum 2	782	800	102%
Stratum 3 - Remainder of Area			
1-person, 0-vehicles	36	31	86%
2+ persons, 0-vehicles	20	7	35%
1-person, 1-vehicle	256	264	103%
2-persons, 1-vehicle	101	96	95%
3-persons, 1-vehicle	42	32	76%
4+persons, 1-vehicle	39	29	74%
1-person, 2+ vehicles	58	68	117%
2-persons, 2-vehicles	340	373	110%
3-persons, 2-vehicles	139	148	106%
4-persons, 2-vehicles	238	274	115%
2-persons, 3+ vehicles	83	102	123%
3 persons, 3+ vehicles	94	114	121%
4+ persons, 3+ vehicles	156	146	94%
Total - Stratum 3	1602	1684	105%

Source: Profile of Selected Characteristics for Johnson, Leavenworth, and Wyandotte Counties, KS and Cass, Clay, Jackson, and Platte Counties, MO from the Census Transportation Planning Package (CTPP 2000) and the 2004 Kansas City Regional Household Travel Survey, unweighted.

The study required sampling a total of 42,050 random households for inclusion in the study. Of this, 10% or 4,001 agreed to participate in the study and 3,049 actually documented their travel. Figure 1 shows the distribution of the 42,050 sampled households, while the locations for the 3,049 participating households are shown in Figure 2.

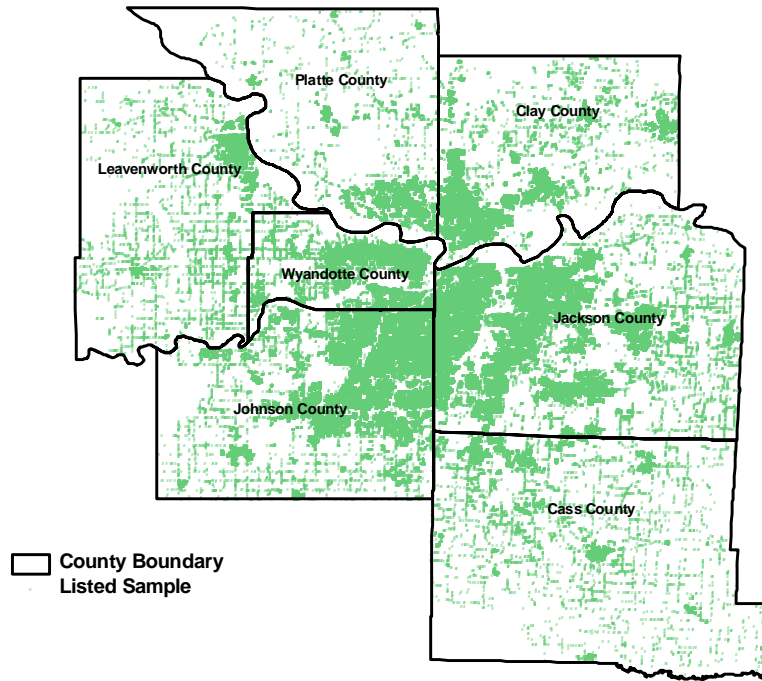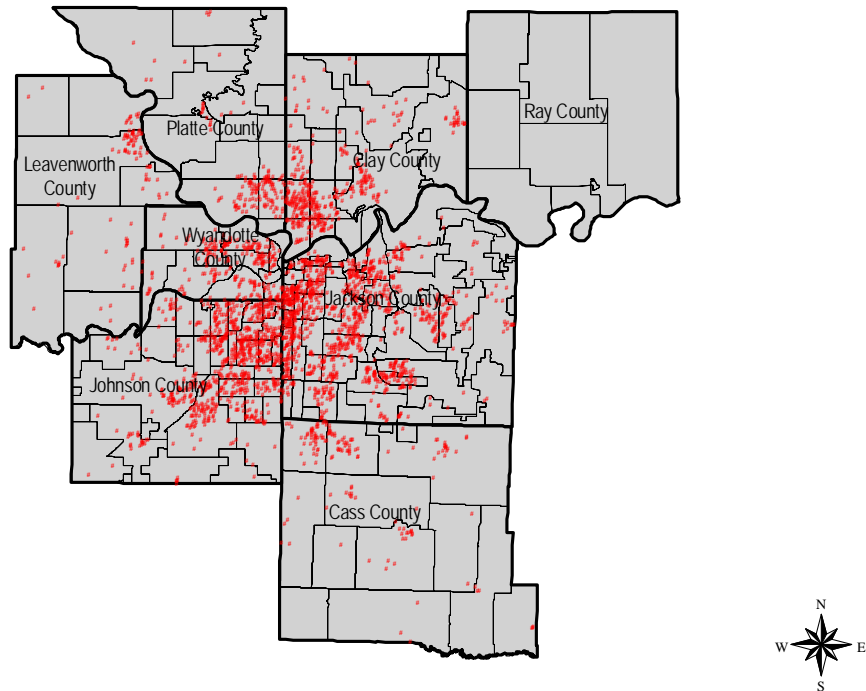## FIGURE 1: SAMPLED HOUSEHOLD LOCATIONS

FIGURE 1: SAMPLED HOUSEHOLD LOCATIONS

FIGURE 2: PARTICIPATING HOUSEHOLD LOCATIONS

Locations of Participating Households

FIGURE 2: PARTICIPATING HOUSEHOLD LOCATIONS

PILOT TEST

The pilot was conducted in November 2003. There were two parts to the pilot test: a comprehensive pretest of the procedures and instruments designed for use in the household travel survey and focus group testing of the materials and survey objectives with respondents from minority populations that typically are under-represented in surveys of this type.

Pretest. The goals of the pretest test were twofold: (1) to conduct a "dress rehearsal" of all procedures and instruments designed for use in the full study, and (2) to evaluate the performance of the questionnaires and respondent materials developed for use in the full study. To achieve these goals, the effort consisted of all activities required to produce a data set comprised of 70 resident households. This included sample generation, advance notification, recruitment, mailing of respondent materials, reminder calls, retrieval, geocoding, quality assurance and data delivery. The zip codes for the pilot were selected to represent three groups of respondents: African Americans (64128 and 64130), Hispanics (64108 and 66105), and Suburban dwellers (64151 and 66212). A total of 104 households were recruited (35 from the predominantly African American region, 25 from the predominantly Hispanic region, and the remaining 43 from the suburban area. Ultimately, 71 of the households provided travel data.

The pretest evaluation focused on the following areas:

- Examine all stages of data flow procedures and quality assurance process.
- Evaluate respondent reaction to the survey process and explore local levels of respondent cooperation and response rates
- Assess project staff training and performance

Prior to the start of the pretest test, evaluation criteria were developed to allow for an objective assessment of instruments, procedures, and processes. Overall, the effort was successful in terms of the procedures and collection of necessary data. The findings included:

1) ***To examine all stages of data flow procedures.*** The household travel survey pretest was designed as a "dress rehearsal". As such, all systems developed for the full study were employed as part of the pretest test. This allowed for a full testing of all systems, from sample generation to respondent contacts to preparation of the final data set. In general, the processes worked well. Full study improvements that were a result of the pretest effort included the identification and incorporation of pre-geocoded landmark, employer, and bus transfer location databases into the CATI program, and streamlining of the city name tables. These changes would allow for more efficient data collection as well as geocoding results with increased accuracy.

2) ***To evaluate respondent reaction to the survey process and explore levels of respondent cooperation and response rates.*** The overall response rate for the pretest test was 27% for the household travel survey, which was slightly higher than that achieved in the Columbus, OH pretest and 2 points lower than what resulted in the St. Louis pre-test. Across the three respondent groups, response rates were highest for the suburbanites (32%), as compared to the predominantly African American (19%) and Hispanic neighborhoods (25%).

3) ***To assess project staff training and performance.*** As a dress rehearsal, interviewers working on the pretest received extensive training utilizing the materials and manuals prepared for use in the full study. Based on the staff debriefs and monitoring results, the CATI scripts were modified to include the reasons behind the request for various data items. These were embedded into the CATI question text or made available to the interviewer on the CATI screen as notes to use as the respondent questions arose (rather than just the hard copy document typically used).

Focus Groups. On Saturday, November 1, 2003, NuStats conducted three focus groups with distinct but important MARC constituent groups: African Americans, Spanish-speaking Hispanics, and English-speaking Hispanics. The groups were held at the Guadalupe Center on Avenida Cesar Chavez in Kansas

City and moderated by Dr. Carlos Arce, a NuStats' executive. The groups were held at 10:30 am, 1:00 pm, and 4:00 pm. Staff of the Guadalupe Center recruited the participants in the Hispanic groups. There were 11 participants in the Spanish-speaking Hispanic group and 9 participants in the English-speaking Hispanic group. The director of the Ivanhoe Neighborhood Association recruited the participants in the African American group. There were 11 participants in that group. All groups were approximately 2 hours in length, and the groups were videotaped.

The goal of the focus groups was to identify strategies for increasing the participation of Hispanics and African Americans in the household travel survey. As a summary of focus group findings below suggests, this goal was achieved.

1. Transportation is an important issue among Hispanics and African Americans. Significant issues include: serving the needs of Spanish-speaking bus patrons, improving personal safety on the bus system, constructing or improving existing sidewalks, constructing or improving existing bike routes, better planning for roadway construction, and future planning for congestion relief.

2. Making the connections between participating in a behavioral survey of travel patterns and distinct benefits to the Hispanic and African American communities is a challenge. It would be helpful if NuStats could brainstorm with MARC staff which on transportation infrastructure improvement over the last 10 years could be linked data resulting from the last household travel survey. The survey might appear more relevant to people if a few attitude and opinion questions about transportation improvements or needs were included in the recruitment questionnaire.

3. Who sponsors the survey is not important. While the survey sponsors (MARC and the DOTs) should be identified in the written materials, it is not necessary that the sponsor be mentioned in the telephone script. It is highly important that the written survey materials identify agencies and organizations that are credible to Hispanics and African Americans as "backers" of the survey effort. These agencies could include specific neighborhood associations, the community centers, and other support agencies. Political organizations should not be included.

4. The project titles should be changed to: Survey on Household Travel Behaviors and Opinions for the Kansas City Region. It is more important to specify the survey area (the Kansas City Region) than use the more homey but ambiguous, Heart of America.

5. The pre-notification postcard should be dropped in favor of the informational brochure. The utility of the pre-notification mailed information is to "prime" the household to receive the recruitment telephone call. The postcard cannot supply adequate detailed information to do this.

6. The brochure needs to be re-written so that there is less text. It can be a self-mailer. The brochure text should "talk to" the individual householder. It should be written to convey the message that each individual household "matters." It should convey specific benefits to communities that will result from the survey data – why you should take the time to complete a 24-hour diary. And, it should provide specifics about how the survey will be done. We should identify types of questions that would be asked and why these types of questions are asked. It must reference the Do Not Call list and the fact that survey organizations are exempt.

7. The recruitment phone call script should be short and to the point. It should mention the name of the study, that a brochure was mailed, and that the call is not sales call. It should happen within a timeframe that had been specified in the informational brochure.

8. The diary package should contain the travel log, example travel log, photo sheet, and a cover letter. We should design photo sheets for specific recipients – White, Black, and Hispanic. Because race is captured during the recruitment interview, we would know prior to sending out the diary package the race of the receiving household. The photo sheet and the example log should reference the same

daily travel pattern. All major milestones should be included. There should be a "hint" on the photo sheet to the reader to be sure to include all "in-between" locations visited.   The Spanish translation of the travel modes and activities should be verified for accuracy and meaningfulness.

9. NuStats should consider offering a $10 post-incentive to households that return accurate and complete travel logs.

10. The survey should be publicized. The mailing of a study package to a comprehensive list of agencies and organizations is imperative. The study package should entreat the recipient to "market" the survey among its constituents and provide reasons why this would be a good thing to do. We should try to get print stories in the Star, the Black periodicals, and the Spanish-language periodicals. These are articles can be included in the brochure mailout to legitimize the survey. We should also try to get PSAs about the survey on radio, if possible. A project web site should be designed both for providing information about why someone should participate and how to participate, as well for providing survey results and feedback to participants.

As a direct result of the focus group feedback, the survey materials underwent significant revisions. In addition to the standard agency review of the final materials, Airick West and Associates also reviewed and provided specific feedback to improve the final materials. The final advance notification brochure is contained in Appendix A, while the survey packet materials are included as Appendix D.

DATA COLLECTION

The changes to the programs, processes, and materials were made in December 2003 and January 2004. Data collection activities began in mid-January and continued through mid-May. These activities centered about six main stages: advance notification, recruitment, material mailing, travel data retrieval, processing, and geocoding. The details regarding each stage are provided in this section.

Advance Notification. The study brochure was mailed to all households for which a name and addresses were known prior to the recruitment call. This brochure served as advance notification to the household that it had been randomly selected and would be receiving a call regarding the study. It provided information about the study sponsor, introduced NuStats DataSource as the company that would be contacting them, and provided the web site address and a telephone number where additional information could be obtained. The brochure can be seen in Appendix A.

Recruitment.   The recruitment interview was administered using a computer-assisted telephone-interviewing (CATI) program. Each household was telephoned by an interviewer to determine if they would participate in the study. If the household agreed, demographic information was collected including income, household size, vehicle ownership, and other household characteristics.   In addition, demographic characteristics were obtained for each member of the household such as age, gender, employment and school status (see Appendix B for the recruitment questionnaire).

The recruitment calls began on January 19th and continued through May 3rd, recruiting a total of 4,001 households. Over the course of the recruitment effort, 40,649 telephone numbers were called. Of these:

- 5,504 (14%) resulted in contact with <u>eligible</u> households.

- 17,593 (43%) were determined to be <u>ineligible</u> (non-working, non-household or non-voice lines, and

- 17,552 (43%) were unable to be classified as eligible or ineligible after 8 call attempts

Of the <u>eligible</u> households reached, 4,001 of the 5,504 agreed to participate in the study (72%). The average length of the recruitment call was 19.5 minutes. It took an average of three call attempts to reach a household for recruitment. Table 3 shows the average interview length and the average number of call attempts it took to reach each household based on household size. As indicated in that table, the larger the household, the longer the interview length. In addition, the number of call attempts increased with household size.

TABLE 3: RECRUITMENT INTERVIEW LENGTH AND CONTACTS

HOUSEHOLD SIZE	N	INTERVIEW LENGTH	# ATTEMPTS
1 person	1,066	14.72 min	2.67
2 persons	1,330	17.52 min	2.80
3 persons	637	20.93 min	3.00
4+ persons	968	26.25 min	3.61
Total	4,001	19.48 min	3.02

The recruitment instrument performed well as item non-response was marginal, as evidenced by the unweighted frequency of responses to the recruitment questionnaire contained in Appendix C. The following is list of questions for which respondents did not all provide answers.

- Vehicle year (1.0% refused)
- Vehicle make (0.1% refused)
- Vehicle body type (0.1% refused)
- Working cigarette lighter (4.2% unknown)
- Bike usage last summer (0.1% refused)
- Planned bike usage this summer (0.8% unknown)
- Planned purpose of bike usage (0.6% unknown)
- Home ownership (0.1% refused)
- Tenure at current residence (0.1% refused)
- Household income (5.5% refused)
- Gender (0.1% refused)
- Age (1.1% refused)
- Ethnicity (0.4% refused)
- Employment Status (2.6% refused)
- Occupation (0.5% refused)
- Land Use Type at Work Location (0.5% unknown)
- Parking location if had to drive to work (15% not provided)
- Typical mode to work (0.4%)
- Educational Attainment (0.6% refused)
- Student Status (0.1% refused)

Two items of note in these levels of item non-response. First, the income non-response at less than 6 percent is extremely low and a reflection of respondent buy-in to the survey. Typically, income non-response is closer to 10 percent. Second, the question about parking location "if had to drive to work" was asked for employed respondents. Most of the time, there was one household informant providing this information, so this detail may not have been readily available to the main respondent. The high level of non-response for this variable was noted during the pilot, and the project team decided to obtain as many data points as possible with the expectation that there would be non-response to this magnitude.

Packet Mailout. The day following recruitment, the demographic information was processed into the master data set and packets were assembled for each recruited household. These packets included a cover letter, study brochure, travel log, sample travel logs (both textual and pictorial), and a postage-paid envelope to return the completed logs after the retrieval interview (see Appendix D). Travel days were scheduled 7 to 10 days after recruitment to allow for sufficient time for packets to reach the households using first class mail.

Reminder Call. The night prior to the assigned travel day, reminder calls were made to the households. This reminder call served three key purposes:
1. Confirm that the household received the packet and answer any questions respondents might have about using the log to track their travel.
2. Schedule an appointment to conduct the retrieval interview.
3. Increase the likelihood that the household will follow-through with recording their travel by re-iterating the importance of the study and the household's commitment to participate.

For those instances where an answering machine was reached, the interviewers left brief messages that referenced a toll-free number for respondents to call if they had questions.

Retrieval. The day after an assigned travel day or at the appointed time, telephone calls were made to retrieve the travel data recorded by each household member. The interviews were guided using CATI programs of the retrieval instrument (see Appendix E). The average interview length was 25 minutes and it took 7 call attempts to reach each household, on average.

TABLE 4: RETRIEVAL INTERVIEW LENGTH AND CONTACTS

HOUSEHOLD SIZE	N	INTERVIEW LENGTH	# ATTEMPTS
1 person	865	15.09 min.	6.42
2 persons	1036	23.04 min.	5.73
3 persons	483	28.23 min.	7.58
4+ persons	665	37.30 min.	7.58
Total	3049	24.7 min.	6.62

Travel days were assigned beginning Monday, February 2nd and continued through Friday, May 14th. Retrieval interviews began on Tuesday, February 3rd and continued through Monday, May 17th. Data was collected from all household members for the 3,049 households that completed the study. This is a retrieval rate of 76% (3049 retrieved / 4001 recruited). It is important to note that although the contract for this project allowed for a small number of "partial" households (where all but one household member participated), the final data set contains travel data for all household members. There are no partials.

The overall response rate for the study is determined by multiplying the recruitment rate (47%) by the retrieval rate (76%). This retrieval rate is slightly higher than the typical range of 70 to 75 percent and again is reflective of respondents that took their participation seriously. For this study, the overall response rate is 36%, calculated according to CASRO standards. This means that 36% of all eligible households contacted about participation in the household travel survey completed all activities associated with the project.

In the survey materials and interview scripts, respondents were assured that their responses would be kept confidential and that their responses would be analyzed in the aggregate only. As a result, the data files were structured such that a 7-digit unique identifier ("sample number") will be used to link each household's data together and documentation was prepared to ensure the public use data files would be stripped of all identifying information prior to their release. Households were randomly assigned to non-Holiday weekdays for recording their travel (Monday-Friday), with Fridays purposefully receiving a lower goal (16% compared to 21% for the remaining days of the week). The final distribution of households by day of week is shown in Table 5.

TABLE 5: DISTRIBUTION OF HOUSEHOLDS BY DAY OF WEEK AND TRIP RATES

DAY OF WEEK	FREQUENCY	PERCENT	AVG. TRIPS	SE MEAN
Monday	653	21.4%	10.6	0.32
Tuesday	687	22.5%	10.8	0.33
Wednesday	642	21.1%	11.2	0.34
Thursday	572	18.8%	10.0	0.34
Friday	495	16.2%	10.2	0.36
Total	3049	100%	10.6	0.15

The number of households that recorded travel on Thursday was lower than expected (19% vs. 21%). This reflects both a lower-than-desired number of households recruited to record their travel on Thursdays as well as a lower-than-average retrieval rate (so fewer households were assigned to Thursdays and of those, retrieval was less than average). The main factor contributing to this was the timing of data collection. On the recruitment side, in order to allow sufficient time for mailing, households recruited over the weekend were assigned to travel on Thursdays. Weekend production tended to be below weekday production. In addition, on the retrieval side, the initial recontact with the household for retrieval was over the weekend, which is the most difficult time to reach households.

The 1990 Kansas City Household Travel Survey only included data recorded Tuesday through Thursday of each week. At the time, the reasoning was that these days were the most "typical." Given MARC's desire to update their model and to incorporate state-of-the-knowledge design elements, the decision was made for the 2004 survey to include data from all five weekdays. As shown in Table 5, there was not a statistical difference in the number of trips reported across these five days.

The retrieval instrument had nominal item non-response. As indicated in the unweighted frequencies contained in Appendix F to this report, the only variable that experienced item non-response was the land use designation for the location visited, which was 0.7% unknown.

GPS Supplement. A subsample of households that participated in the general travel survey also participated in the GPS supplement. The purpose of the supplement was to provide an independent data stream (captured through the use of global positioning systems or GPS) to audit the CATI-reported trip data. The results of prior travel surveys suggest that some respondents have a tendency to under-report their trip-making activities (either intentionally due to the long interview length or unintentionally, not realizing all stops should be recorded). The GPS supplement had two activities: recording vehicular travel and conducting a prompted recall survey aimed at a small portion of those that had not recorded all their trips (according to the GPS data streams).

The main portion of the GPS supplement was the collection of vehicular travel. This entailed contacting a sample of the households recruited for the study and requesting their participation in the study. Of the 4,001 households recruited for the study, 1,666 (55%) indicated an interest in participating in the GPS study. The remainder were either not interested (22%) or ineligible due to either not owning a household vehicle or not having a household vehicle with a working cigarette lighter (23%). GeoStats contacted a portion of the interested households assigned to each particular travel day and enlisted their participation in the GPS supplement.

Participation entailed the installation of the GPS equipment into the vehicle, using that equipment during all vehicle trips, and subsequent retrieval of the equipment. Of the 1,666 households interested in participating in the GPS study, equipment was deployed to 294 households over the time period of Monday, February 2nd through Wednesday, April 28th. The following table shows the results of the deployment effort. Complete GPS and CATI data are available for 228 households, which exceeded the deployment goal of 150 to 200 households.

TABLE 6: DISPOSITION OF GPS DEPLOYMENT EFFORTS

DEPLOYMENT OUTCOME	FREQUENCY	PERCENT
Complete (GPS + CATI)	228	77%
Full GPS data but no CATI data	8	3%
Partial GPS data and full CATI data	23	7%
Partial GPS data but no CATI data	4	2%
No GPS data but full CATI data	29	10%
No GPS data and no CATI data	2	1%
Total	294	100%

In the second part of the GPS supplement, GeoStats reviewed the CATI data as compared to the GPS data. They found that 89% of all trips reported in both CATI and GPS matched. A follow-up survey was conducted with 32 households in which the GPS data showed a trip but there was not a corresponding match in the CATI data.[3] A small questionnaire was sent to those households that showed the discrepancies to the participant through a two-list comparison between the reported and acquired data, along with a map of the unmatched, acquired trips. The participants were then asked to identify the unreported stops, the driver of the vehicle, and the number of household members with them at the time and the reason for not reporting the stops/trips. A total of 27 households completed the survey, providing details about 45 "missed trips." The reasons provided for not recording the trips are shown in Table 7.

TABLE 7: GPS PROMPTED RECALL MISSED TRIP EXPLANATIONS

REASON FOR NOT REPORTING THE STOP	# STOPS	PERCENTAGE
I forgot	12	26.7%
I didn't know about this stop	2	4.4%
I didn't think this stop was important	23	51.1%
This was not a stop - it was a traffic delay	4	8.9%
Other (Please give details)	4	8.9%
Total	45	100.0%

Processing. Data processing took place throughout the study, beginning with the creation of the advance brochure mailing, continuing with the release of sample for recruitment, processing recruitment data for the respondent mailout, appending the retrieval data to the master tables, and performing initial quality control measures on the data. A master control file tracked the progress of each household through the various survey stages, with codes to allow immediate identification of problem cases that were not progressing according to schedule as well as confirmation that cleared cases moved along as appropriate. Routine data checks included the following:

- Data range checks to ensure data were inside the expected ranges for each variable and that there was agreement across data files (for example, if the household had 4 persons and 2 vehicles, there should be 4 records in the person file and 2 records in the vehicle file).

- Confirmation that travel data were collected from all household members.

- If a person reported no travel, the household was flagged for manual review to confirm the reason for non-travel was appropriate based on the demographic characteristics of the household member. Those cases where the reason for non-travel was suspect or did not make sense within the context of the available demographic information were flagged and returned to DataSource for confirmation or replacement.

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[3] The number of households included in the GPS prompted recall survey was based on available funding.

- Within the travel data itself, several items were checked. The following are examples of conditions researched within the trip data:

  - Did each trip begin and end at a different location? Loop trips (those that have the same origin and destination) might be neighborhood walks, which were treated as at-home non-work activities rather than a trip.

  - Did each person return home at the end of the travel day? If not, did the final recorded destination make sense within the context of the household and person characteristics?

  - For all instances where a respondent reported traveling with other household members, was the shared trip reported for all other household?

  - For all trips with "auto-driver" as the reported mode, was the respondent a licensed driver?

  - For all trips reported as "auto-passenger", did another household member report the same trip as an auto-driver? If not, did the passenger report riding in a non-household vehicle with at least one other person making the trip?

Geocoding. The term "geocoding" defines the process of evaluating address information with the goal of assigning a geocode corresponding to the state plane coordinates of the location. This process took place throughout the course of the project, beginning with the home addresses, continuing with habitual addresses (work and school locations), and also including the trip ends (non-home and non-habitual locations) collected during the retrieval stage of the project.

Using ArcView software, all home, work, school and trip locations reported were subjected to the geocoding task, using coverage files provided by MARC. During the course of the project, respondents reported visiting a total of 18,527 addresses, which comprise the final "location" file for the 3,049 households that completed the study. Of these, 98% were successfully matched to latitude/longitude coordinates or identified as falling outside the study area. The distribution of addresses by type and geocoding status is shown in Table 8.

As shown in Table 8, there were two different types of matching. The first ("GC Match") refers to addresses matched by NuStats geocoding technicians using the coverage files and respondent provided information. The other type of matching ("List Match") refers to instances where the respondent provided details to ensure a reliable match against an address in one of several lists provided by MARC. The lists included major employers, regional schools, landmarks, and most active bus stop transfer locations and were added to the CATI programs based on findings from the pilot test. In the data set, those locations matched to a list have a code of "L" while those matched through the standard geocoding process are marked with an "M" to help distinguish the source of the geocode information.

TABLE 8: GEOCODING OUTCOMES BY ADDRESS TYPE FOR ALL ADDRESSES COLLECTED

LOCATION	GC MATCH	LIST MATCH	OUT OF AREA	UNMATCHED	TOTAL
Home	100.0%				100.0%
Work	88.5%	7.5%	1.7%	2.3%	100.0%
School	87.5%	10.0%	1.2%	1.2%	100.0%
Other	96.0%	1.5%		2.4%	100.0%
Out of Area			100.0%		100.0%
Total	93.4%	3.5%	1.3%	1.9%	100.0%

The results in Table 8 consider all addresses reported, including those work and school locations that were provided during recruitment but were not used on the travel day. All (100%) home addresses, 96% of work locations, 98% of school locations, and 98% of all other locations were geocoded.

DATA WEIGHTING

As discussed earlier, the sample design was crafted to enable the collection of data from a representative and randomly selected sample of households from the Kansas City region. Demographic and geographic targets were used to guide data collection with the goal of having a final data set that reflected the 2000 Census population proportions of households by size and vehicle ownership, across three geographies defined by densities. Although the sample was randomly selected, not all sampled households agreed to participate, nor did all households that agreed to participate actually complete the study. This resulted in a non-response bias in the data set. To correct for this, the final data set includes a weight variable that was developed to account for the non-response bias of particular population segments. There is also an expansion weight that factors the survey data to represent total households in the Kansas City region. The 2000 Census data for the 7-county region was used to calculate these factors.

The basis for the weight calculations was the sampling plan. As detailed in that technical memorandum and summarized in an earlier section of this report, the sample was drawn to support the identification and inclusion of households based on geographic location, size, and vehicle ownership. The weighting process thus entailed three steps: determining the census proportion of households for each of the three variables (geography, size, and ownership), identifying the survey proportion of households in the same categories, and creating a weight factor that adjusts the survey proportion of households into alignment with that of the census. The process used was iterative proportionate fitting. This meant that the data were first weighted for geography, and then a raking procedure was used that readjusted the weight to balance the proportions of the three variables. After five rounds, the weights converged and the weighted survey proportions matched those of the census.

The expansion factor was calculated by dividing the total households based on Census 2000 data (655,197) by the number of households surveyed (3,049) and determined to be 214.88914. The unique weight for each household type was multiplied by 214.88914 to create the expansion factor for each household. It is designated as "expwgt" in the data file.

SAMPLE VALIDATION

The purpose of this section is to review the survey results with regards to general population parameters as reflected in the 2000 Census, focusing on key demographic characteristics. This is followed by a comparison of the work trip characteristics reported in the survey data as compared to those reflected in the Census Transportation Planning Package Profile for the seven-county Kansas City metropolitan region. All survey data presented in this section are weighted.

The first comparison is on key household characteristics, including household size, vehicles, household workers, household income, residence type, and home ownership. For the most part, the weighted data compare favorably with the census data, indicating that the survey data set is representative of the regional population. The difference in the distribution of respondents based on residence type can be explained somewhat based on the proportion of sample types used in the study. Listed telephone numbers (those with complete address information for the household) are typically associated with households of longer tenure, which is correlated with living in a single-family dwelling and home ownership. Renters, who are considered to be more transient and living in housing types not characterized as single-family dwellings, may change telephone numbers more often and are typically more likely to have a number that is incomplete or not including in the listed telephone number database. The proportion of listed to not listed sample used in this study was 50/50, meaning that of the 40,000 pieces of sample used, 20,000 were associated with listed numbers and 20,000 were not. An effort more focused on renters would have required the use of more unlisted than listed numbers, which was not possible within the project's budget. Thus, the desire to achieve a good mix of residence type was balanced with the project budget and as a result, residence type came within 10% of the census parameters, but not within 5% like the other variables.

TABLE 9: SURVEY HOUSEHOLD CHARACTERISTICS COMPARED TO CENSUS

CHARACTERISTIC	RAW DATA	WEIGHTED DATA	CENSUS DATA
Household Size			
1	28.4%	27.5%	27.4%
2	34.0%	32.9%	32.9%
3	15.8%	16.2%	16.2%
4+	21.8%	23.5%	23.5%
Household Vehicles			
0	5.3%	7.4%	7.4%
1	32.0%	33.9%	33.9%
2	44.2%	41.7%	41.7%
3+	18.5%	17.0%	17.0%
Geography			
Urban	18.5%	20.6%	20.6%
Suburban 1st Ring	26.2%	26.0%	26.0%
Remainder	55.2%	53.4%	53.4%
Household Income			
< $15k	8.9%	9.6%	12.2%
$15k - < $25k	9.5%	9.7%	11.3%
$25k- < $50k	29.7%	29.8%	30.1%
$50k - < $100k	37.6%	36.1%	33.6%
$100k +	14.4%	13.7%	12.8%
Income refusals	5.5%	5.5%	--
Residence Type			
Single family	78.4%	76.9%	69.0%
All other types	21.6%	23.1%	31.0%

Source: 2000 Census and Kansas City Regional Household Travel Survey, weighted.

The key person characteristics of age and ethnicity also track the census fairly well once weighted. The higher proportion of "other" ethnicities reflects Hispanic respondents who identified themselves as such in answer to this question.

TABLE 10: SURVEY PERSON CHARACTERISTICS COMPARED TO CENSUS

CHARACTERISTIC	RAW DATA	WEIGHTED DATA	CENSUS
Respondent Age			
<20	28.7%	30.3%	29.10%
20 – 24	3.6%	3.6%	6.10%
25 – 54	42.3%	41.7%	45.30%
55 – 64	10.6%	9.8%	8.20%
65+	14.8%	14.6%	11.30%
Respondent Ethnicity			
White	84.8%	83.4%	81.60%
Black/African American	9.1%	10.2%	14.10%
Other	6.1%	6.4%	4.30%

Source: 2000 Census and Kansas City Regional Household Travel Survey, weighted.

The 2000 Census Transportation Planning Package Profile for the seven-county metropolitan region was used to review the worker flow characteristics. As shown in the following figures, the commute trip characteristics of the participating household members on the assigned travel day tracks those reflected in the census fairly well. In terms of gender, the survey contains a slightly higher proportion of female workers compared to male workers, but still within 5% of the census.

FIGURE 3: WORKER COMPARISON
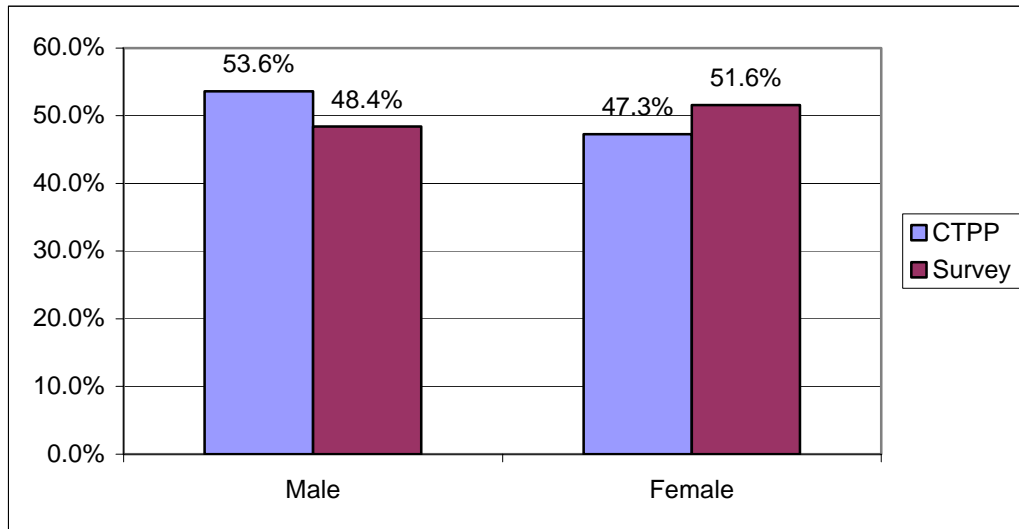
As in the journey to work data, the majority of employed respondents in the survey reported driving or riding as an auto passenger to work (91%) on the assigned travel day. The proportion of workers telecommuting in the survey data was higher than what was reported in the census (6% compared to 3%), while the proportion of workers who commuted by walk or bike was relatively the same. "Other" responses included taxi and paratransit modes.

TABLE 11: MODE TO WORK COMPARISON

MODE	CTPP	SURVEY
Auto	93.7%	91.1%
Transit	1.3%	1.3%
Bike/Walk	1.3%	1.4%
Other	0.6%	0.3%
Work at Home	3.2%	5.9%

Source: 2000 Census and Kansas City Regional Household Travel Survey, weighted.

The survey respondents reported the same work commute time as what was captured in the census journey to work data (24 minutes for the survey and 23 minutes for the census). The largest noticeable difference between the two data sources is in the 20 to 29 minute commutes, where the census shows 26% of all trips taking this long, while in the survey data, only 20% were of that length. This difference is somewhat attributable to the way the census question was worded (how many minutes did it usually take this person to get to work last week) compared to how the work trip travel time was computed (time it took to leave home and arrive at work on a specific travel day, with the trip start and end times being reported by the respondent).

FIGURE 4: TRAVEL TIME COMPARISON
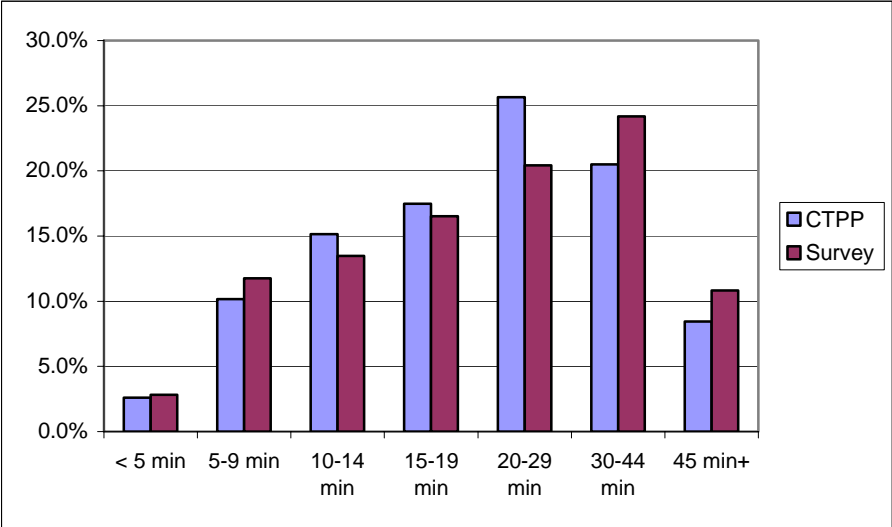
In general, with regard to both demographic and the journey to work information reported by the participating households, the Kansas City Regional Household Travel Survey is representative of the study area population.

SURVEY RESULTS

A total of 3,049 regional households participated in the Kansas City Regional Household Travel Survey. These households provided data about their household composition, vehicles owned, and travel about the region. When properly weighted to adjust for non-response, the data contains details about 7,570 household members, 5,355 vehicles, and details regarding 32,211 trips during a 24-hour period. When expanded to the survey universe, the travel data represents 655,197 households, 1,626,554 persons, 1,150,769 vehicles, and 6,899,591 trips. In all, the households reported an average of 10.56 daily household trips and 4.26 daily person trips.

The purpose of this chapter is to summarize characteristics of participating households and to provide details highlighting how demographic variations in the households across the study area are reflected in the travel behavior data. It is organized about the following topics: summary of respondent characteristics, their associated travel behavior, trip characteristics, then a more detailed look at mode choice. The chapter concludes with a review of the travel times reported by respondents, including travel destinations during specific time periods. All results are weighted, unless otherwise noted, and most discussions focus on the differences in characteristics and travel across the three geography areas of urban (highest density), 1st ring of suburban (referred to as "suburban" in the following tables), and the remainder of the 7-county area (from 2nd ring suburban down to rural densities). Table 12 shows how the households are distributed across both the area designations and the counties.

TABLE 12: AREA BY COUNTY

COUNTY	GEOGRAPHIC AREA			TOTAL
	Urban	Suburban 1st Ring	All Other	
Johnson County, KS	1.5%	6.9%	17.9%	26.4%
Leavenworth County, KS	--	--	3.1%	3.1%
Wyandotte County, KS	3.9%	3.0%	1.6%	8.6%
Cass County, MO	--	--	4.8%	4.8%
Clay County, MO	.3%	3.7%	8.3%	12.3%
Jackson County, MO	14.9%	12.4%	13.1%	40.4%
Platte County, MO	--	0.1%	4.4%	4.5%
TOTAL	20.6%	26.0%	53.3%	100.0%

RESPONDENT SUMMARY

The 3,049 households reported an average of 2.48 persons each. Households in the urban portions of the region were the smallest, with an average household size of 2.19 persons. Household size increased as densities decreased, with those households outside the urban and suburban 1st ring reporting the most household members (2.68 persons on average).

TABLE 13: HOUSEHOLD SIZE BY AREA

HH SIZE	URBAN (N=628)	SUBURBAN (N=794)	ALL OTHER (N=1,627)	TOTAL (N=3,049)
1 person	40.4%	31.3%	20.6%	27.5%
2 persons	29.6%	35.5%	32.9%	32.9%
3 persons	12.6%	15.8%	17.8%	16.2%
4+ persons	17.5%	17.4%	28.8%	23.5%
Total	100.0%	100.0%	100.0%	100.0%
Average	2.19	2.30	2.68	2.48
S. E. Mean	0.05	0.05	0.03	0.02

Source: Kansas City Regional Household Travel Survey, weighted.

On average, households reported 1.76 vehicles per household. Again, vehicle ownership increased as densities decreased, with the urban households reporting 1.27 vehicles on average, suburban households reporting 1.69 vehicles per household, and those in the remaining area 1.98 vehicles. Zero-vehicle households were most likely to reside in the urban area.

TABLE 14: HOUSEHOLD VEHICLES BY AREA

HH VEHICLES	URBAN (N=628)	SUBURBAN (N=794)	ALL OTHER (N=1,627)	TOTAL (N=3,049)
0 vehicles	15.4%	4.6%	2.3%	5.3%
1 vehicle	45.3%	37.3%	25.0%	32.0%
2 vehicles	29.7%	41.5%	50.4%	44.2%
3+ vehicles	9.6%	16.6%	22.4%	18.5%
Total	100.0%	100.0%	100.0%	100.0%
Average	1.27	1.69	1.98	1.76
S. E. Mean	0.4	0.03	0.02	0.02

Source: Kansas City Regional Household Travel Survey, weighted.

Not only did vehicle ownership vary, but the age of the vehicles also differed by geography. Vehicles in the urban area tended to be older, with an average manufacture year of 1995.

TABLE 15: FLEET AGE BY AREA

VEHICLE YEAR	URBAN (N=799)	SUBURBAN (N=1,341)	ALL OTHER (N=3,216)	TOTAL (N=5,355)
Before 1990	19.4%	12.7%	8.6%	11.2%
1990 – 1994	20.3%	19.7%	13.8%	16.3%
1995 – 1999	34.4%	34.2%	34.3%	34.3%
2000 - 2002	17.3%	24.8%	29.7%	26.6%
2003	5.8%	5.5%	9.6%	8.0%
2004	1.8%	2.1%	3.1%	2.7%
Refused	1.3%	1.0%	0.9%	1.0%
Total	100.0%	100.0%	100.0%	100.0%
Average Year	1995	1996	1997	1996
S. E. Mean	0.29	0.18	0.12	0.09

Source: Kansas City Regional Household Travel Survey, weighted.

In addition to documenting the vehicle year, make and model, respondents were asked to categorize the body type of the vehicle. Two-thirds (67%) of all urban vehicles were automobiles. While auto was the dominant vehicle type reported overall, SUVs and pick-up trucks were most likely to be reported by households in the outlying areas

TABLE 16: VEHICLE BODY TYPE BY AREA

BODY TYPE	URBAN (N=799)	SUBURBAN (N=1,341)	ALL OTHER (N=3,216)	TOTAL (N=5,355)
Auto/Car/Station Wagon	67.2%	62.7%	53.2%	57.7%
Van	9.5%	10.8%	11.8%	11.2%
Sports Utility Vehicle	7.9%	10.4%	16.9%	14.0%
Pick-up Truck	12.5%	13.0%	15.4%	14.4%
Other Truck	0.5%	0.2%	0.5%	0.4%
RV	--	0.2%	0.3%	0.2%
Motorcycle	1.3%	1.9%	1.6%	1.6%
Other	1.0%	0.7%	0.2%	0.4%
Refused	0.1%	--	0.1%	0.1%
Total	100.0%	100.0%	100.0%	100.0%

Source: Kansas City Regional Household Travel Survey, weighted.

The larger households in the outlying areas reported more workers than those in the urban area. Almost one-third of the urban households (31%) reported having no workers, compared to 25% in the 1st suburban ring and 16% in the remaining portion of the region.

TABLE 17: HOUSEHOLD WORKERS BY AREA

HH WORKERS	URBAN (N=628)	SUBURBAN (N=794)	ALL OTHER (N=1,627)	TOTAL (N=3,049)
0 workers	30.7%	25.1%	15.7%	21.2%
1 worker	45.1%	39.6%	36.9%	39.3%
2+ workers	24.2%	35.3%	47.4%	39.5%
Total	100.0%	100.0%	100.0%	100.0%
Average	0.97	1.15	1.39	1.24
S. E. Mean	0.03	0.03	0.02	0.02

Source: Kansas City Regional Household Travel Survey, weighted.

Given the lower proportion of workers in the urban area, it is not surprising to see that 21% of households in the urban area reported annual incomes of less than $15,000. The highest incomes were reported in the outlying area, with 18% reporting incomes of $100,000 or more (compared to 4% in the urban area and 9% in the 1st suburban ring).

TABLE 18: HOUSEHOLD INCOME BY AREA

HH INCOME	URBAN (N=628)	SUBURBAN (N=794)	ALL OTHER (N=1,627)	TOTAL (N=3,049)
< $15,000	20.6%	10.2%	5.1%	9.6%
$15,000 - < $25,000	19.7%	10.1%	5.6%	9.7%
$25,000 - < $35,000	15.9%	15.4%	8.4%	11.8%
$35,000 - < $50,000	17.0%	19.1%	14.9%	16.4%
$50,000 - < $75,000	12.9%	19.1%	23.0%	19.9%
$75,000 - < $100,000	4.9%	11.2%	19.2%	14.2%
$100,000 +	4.1%	8.8%	18.4%	12.9%
Refused	4.9%	6.0%	5.5%	5.5%
Total	100.0%	100.0%	100.0%	100.0%

Source: Kansas City Regional Household Travel Survey, weighted.

The differences between households in the urban portions of the region as compared to those in the rest of the region are also seen in terms of home ownership. Only 56% of urban residents owned their home, compared to 78% in the 1st suburban ring of the region and 83% in the remaining portion of the study area. Conversely, renters were more prominent in the urban area. "Other" included employer-provided housing (such as military housing or parsonages) and people living in relatives homes for free.

TABLE 19: HOME OWNERSHIP BY AREA

HH OWNERSHIP	URBAN (N=628)	SUBURBAN (N=794)	ALL OTHER (N=1,627)	TOTAL (N=3,049)
Own	56.1%	78.1%	82.5%	75.9%
Rent	42.2%	21.0%	16.1%	22.8%
Other	1.8%	0.9%	1.5%	1.0%
Total	100.0%	100.0%	100.0%	100.0%

Source: Kansas City Regional Household Travel Survey, weighted.

Most households (38%) reported having lived in the Kansas City area for at least 10 years, while 11% reported being new to the area. The urban area households were the most diverse in terms of tenure, with 15% reporting that they had lived there for less than one year and 40% reporting tenure of 10 or more years.

TABLE 20: TENURE BY AREA

TENURE	URBAN (N=628)	SUBURBAN (N=794)	ALL OTHER (N=1,627)	TOTAL (N=3,049)
Less than 1 year	15.3%	10.3%	10.3%	11.3%
1 to 2 years	11.6%	10.7%	13.6%	12.5%
3 to 5 years	18.5%	16.5%	24.2%	21.0%
6 to 10 years	14.2%	14.1%	19.2%	16.9%
10 or more years	40.3%	48.4%	32.5%	38.2%
Refused	0.2%	--	0.2%	0.1%
Total	100.0%	100.0%	100.0%	100.0%

Source: Kansas City Regional Household Travel Survey, weighted.

In addition to obtaining demographic information about each household, respondents were asked about their bicycle riding habits, both last summer and what was planned for this summer. As shown in Figure 5, households in the suburban area were least likely to have ridden bicycles last summer, and were least likely to ride bikes this coming summer.

FIGURE 5: BICYCLE USAGE BY AREA

	Rode Bikes Last Summer	Will Ride Bikes This Summer
Urban	23%	28%
Suburban	18%	23%
All Other	22%	28%
Total	21%	27%
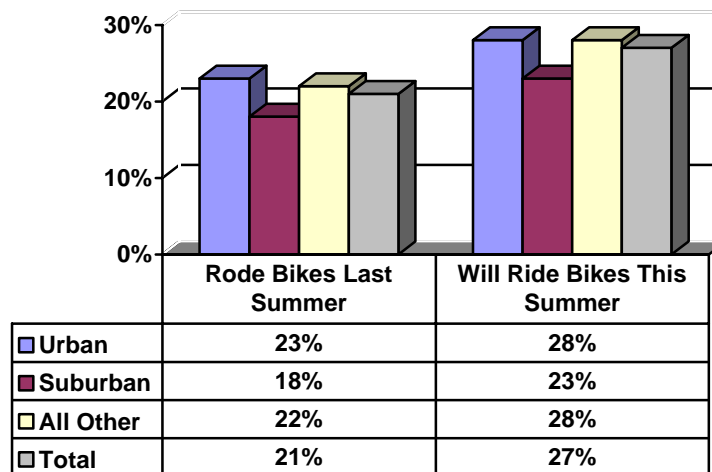
The survey also elicited opinions of the regional households in terms of what elements of the transportation infrastructure improvements were most important to them and how well their needs were being met in terms of provision of those elements. The elements included sidewalks, neighborhood bike paths, conveniently located bus stops, uncongested roadways, timely information about traffic tie-ups, the importance of neighborhood input on construction projects, and, for the 27 households who spoke Spanish only, bi-lingual transit information. The importance of each element and its associated rating by where the household is located is shown in the seven figures that follow.

FIGURE 6: IMPORTANCE AND RATING OF HAVING SIDEWALKS BY AREA

	Importance of Sidewalks	Rating of Sidewalks
Urban	4.4	2.9
Suburban	3.9	2.6
All Other	3.9	3.2
Total	4.0	3.0
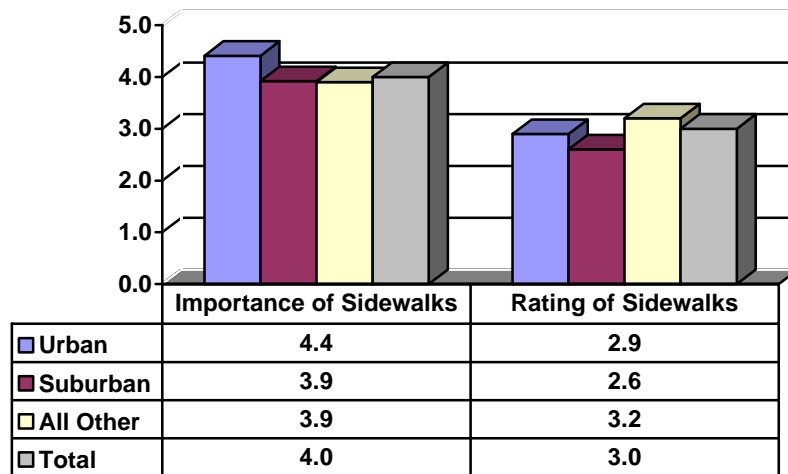
FIGURE 7: IMPORTANCE AND RATING OF HAVING NEIGHBORHOOD BIKE PATHS BY AREA

	Importance of Bike Paths	Rating of Bike Paths
Urban	3.2	1.6
Suburban	2.9	1.6
All Other	3.1	2.0
Total	3.1	1.8
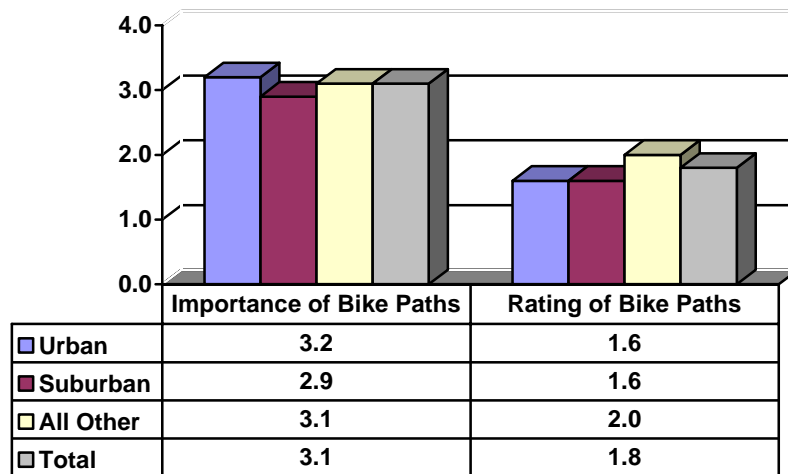
FIGURE 8: IMPORTANCE AND RATING OF HAVING CONVENIENTLY LOCATED BUS STOPS BY AREA

	Importance of Bus Stop Location	Rating of Bus Stop Location
Urban	4.2	3.5
Suburban	3.2	2.6
All Other	2.7	1.8
Total	3.1	2.4
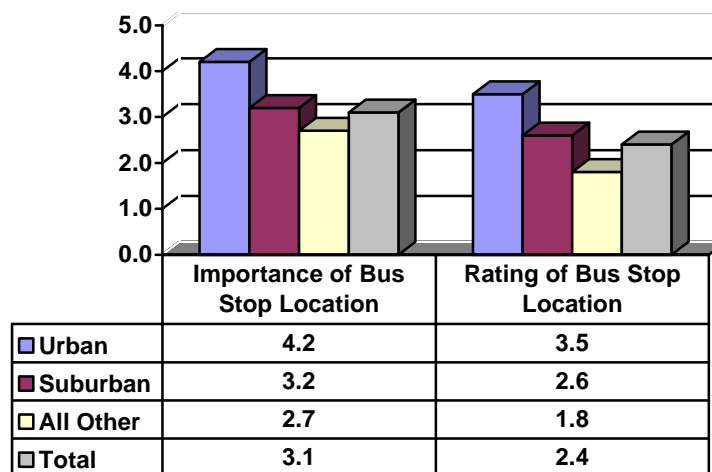
FIGURE 9: IMPORTANCE AND RATING OF HAVING UNCONGESTED ROADWAYS BY AREA

	Importance of Uncongested	Rating of Uncongested
☐ Urban	4.4	3.2
◼ Suburban	4.3	3.3
☐ All Other	4.4	3.3
☐ Total	4.4	3.3
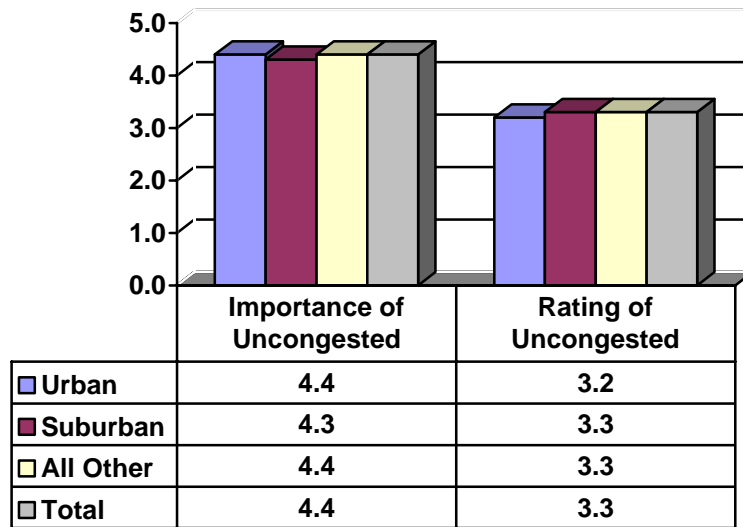
FIGURE 10: IMPORTANCE AND RATING OF HAVING TIMELY TRAFFIC INFORMATION BY AREA

	Importance of Traffic Information	Rating of Traffic Information
☐ Urban	3.8	3.0
◼ Suburban	3.8	3.1
☐ All Other	3.8	3.1
☐ Total	3.8	3.1
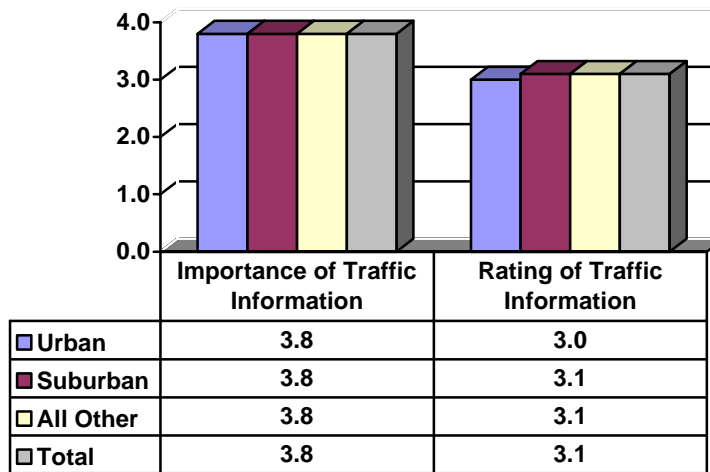
FIGURE 11: IMPORTANCE AND RATING OF OBTAINING NEIGHBORHOOD INPUT ON CONSTRUCTION PROJECTS BY AREA
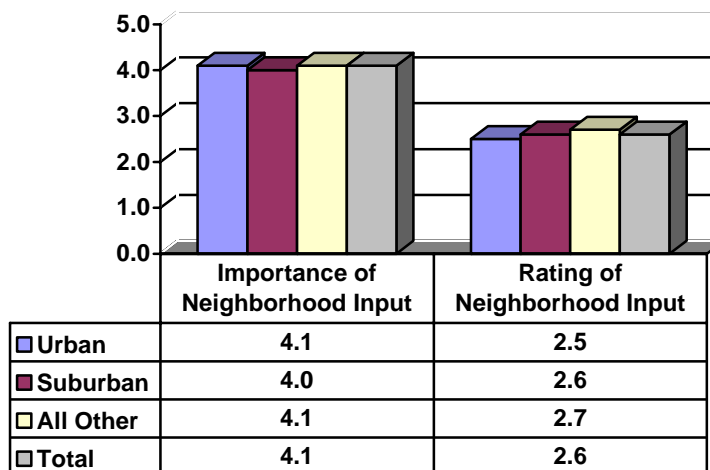
	Importance of Neighborhood Input	Rating of Neighborhood Input
☐ Urban	4.1	2.5
◼ Suburban	4.0	2.6
☐ All Other	4.1	2.7
☐ Total	4.1	2.6

	Importance of Bi-Lingual Info	Rating of Bi-Lingual Info
Urban	4.7	2.9
Suburban	5.0	2.5
All Other	4.8	2.2
Total	4.8	2.6
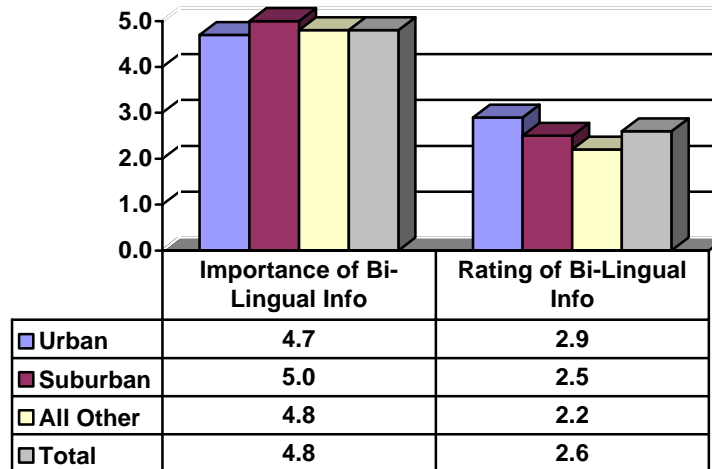
Person Characteristics. The distribution of respondents by gender was fairly consistent across the region. As shown in Figure 13, 47% of respondents were male and 53% female.

FIGURE 13: RESPONDENT GENDER BY REGION

	Male	Female
Urban	45%	55%
Suburban	46%	54%
All Other	48%	52%
Total	47%	53%
Census	49%	51%
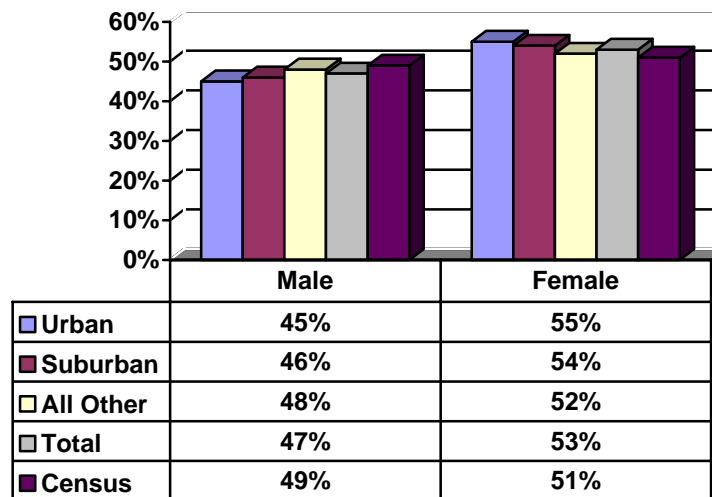
Residents in the 1st suburban ring were older, on average, than those in other regions. Households in the outlying portion of the region had the highest proportion of children under the age of 16 (28% compared to 23% urban and 1st ring suburban).

TABLE 21: RESPONDENT AGE BY AREA

AGE	URBAN (N=1,377)	SUBURBAN (N=1,826)	ALL OTHER (N=4,367)	TOTAL (N=7,570)	CENSUS
Under 16	22.9%	23.0%	27.9%	25.8%	22.2%
16 to 19	5.7%	4.0%	4.4%	4.5%	6.9%
20 to 24	3.8%	4.3%	3.3%	3.6%	6.1%
25 to 34	11.5%	10.8%	11.4%	11.2%	14.8%
35 to 44	13.4%	13.3%	16.9%	15.4%	16.9%
45 to 54	15.3%	14.7%	15.1%	15.0%	13.7%
55 to 64	10.4%	10.6%	9.3%	9.8%	8.2%
65 or older	16.6%	18.4%	10.4%	13.5%	11.3%
Refused	0.0%	1.0%	1.3%	1.1%	--
Total	100.0%	100.0%	100.0%	100.0%	100.0%
Average	38.73	39.52	34.78	36.65	
S. E. Mean	0.64	0.58	0.34	0.27	

Source: Kansas City Regional Household Travel Survey, weighted.

Ethnicity was asked of the main respondent in each of the 3,049 households. Following the census, it was asked in two questions: first focusing on Hispanic origin, followed by ethnic origin. The results are shown in Tables 22 and 23. The "Other" responses in Table 23 indicate where respondents provided "Hispanic" as their ethnicity and did not identify any other ethnicity.

TABLE 22: HISPANIC ORIGIN BY AREA

HISPANIC ORIGIN	URBAN (N=628)	SUBURBAN (N=794)	ALL OTHER (N=1,627)	TOTAL (N=3,049)
Yes	5.9%	2.6%	2.8%	3.4%
No	93.9%	97.4%	97.0%	96.5%
Refused	0.2%	--	0.1%	0.1%
Total	100.0%	100.0%	100.0%	100.0%

Source: Kansas City Regional Household Travel Survey, weighted.

TABLE 23: ETHNICITY BY AREA

ETHNICITY	URBAN (N=628)	SUBURBAN (N=794)	ALL OTHER (N=1,627)	TOTAL (N=3,049)
White	59.7%	85.9%	91.2%	83.4%
African American	29.5%	9.2%	3.3%	10.2%
Asian	1.0%	0.3%	0.9%	0.8%
Native American	0.6%	0.9%	0.5%	0.6%
Other	9.0%	3.8%	3.9%	4.9%
Total	100.0%	100.0%	100.0%	100.0%

Source: Kansas City Regional Household Travel Survey, weighted.

Of all respondents age 16 and older, 71% were employed in a paying job. As indicated earlier concerning the number of workers per household, urban households were more likely to have members age 16+ that were not employed.

	Employed	Not Employed
☐ Urban	62%	38%
■ Suburban	69%	31%
☐ All Other	75%	25%
☐ Total	71%	29%
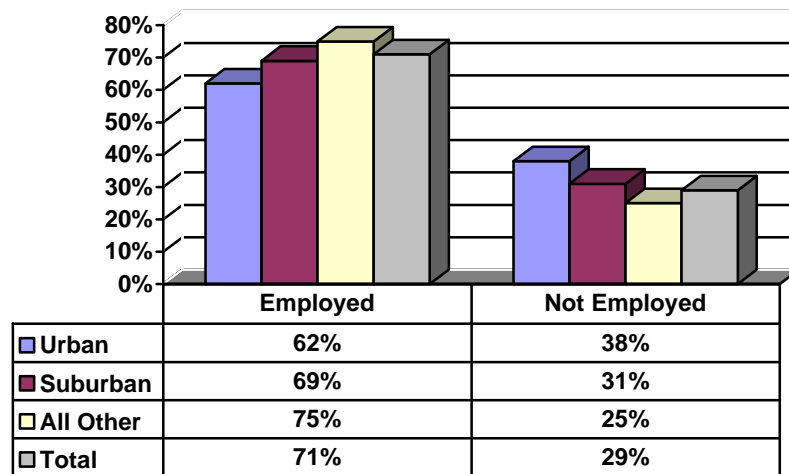
For the employed respondents, almost half (43%) reported their occupation to be "professional," while 29% were in sales/service and 13% indicated their jobs were clerical or administrative in nature. The survey distribution is fairly consistent with the national distribution of workers across these same categories, as captured in the 2001 Nationwide Household Travel Survey.

TABLE 24: OCCUPATION BY AREA

OCCUPATION	URBAN (N=660)	SUBURBAN (N=967)	ALL OTHER (N=2,374)	TOTAL (N=4,002)	2001 NHTS
Sales/Service	30.6%	31.4%	27.8%	29.2%	26.8%
Clerical/Administrative	15.0%	13.7%	12.8%	13.3%	12.4%
Manufacturing/construction/farming	13.6%	12.1%	10.4%	11.3%	19.7%
Professional	34.9%	39.0%	46.6%	42.8%	40.6%
Other	5.9%	3.8%	2.4%	3.3%	0.4%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Sources: Kansas City Regional Household Travel Survey, weighted and the 2001 Nationwide Household Travel Survey, weighted.

Summary. The household characteristics did vary across the three geographic areas defined for purposes of this study. These demographic variations affect the travel behavior summaries and are important to keep in mind while reviewing the remaining report sections.

- Urban. In general, participating households in the urban areas tended to be smaller than those in the rest of the region, with fewer children. They reported owning older vehicles than other households, had the lowest average number of workers per household, and reported lower incomes than households elsewhere. They were more likely to rent their home (42% compared to 23% overall) and were the most ethnically diverse (60% white compared to 83% overall).

- 1st Suburban Ring. Households in the first suburban ring tended to fall in between the urban and other households in terms of household size, vehicles, income, and number of workers. However, they were the most settled, with 48% reporting they had lived at their current location for more than 10 years (compared to 38% overall). They were least likely to ride bicycles, either last summer or plan to this coming summer. They were also older (28% reporting ages 55+ compared to 23% overall).

- All Other Portions of the Region. Households living in the lower density areas of the region were larger, reported a higher proportion of children, and were more likely to be employed. They owned newer vehicles and reported higher incomes. They were also more likely to own their homes.

The previous section provided a summary of the demographic characteristics for the participating households. The variations among participating households based on the area of residence suggests that travel behavior also varies throughout the region. The purpose of this section is to review the travel behavior reported by the 3,049 participating households in order to document the extent to which the travel behavior does vary. This includes summaries of trip rates by the different household and person characteristics for each area of the region as well as the total study area.

Household Travel. Of the 3,049 participating households, 29 or 1% reported making no travel on the assigned travel day. This proportion is well within the standards for a 0-trip household rate (not to exceed 10%) and is a strong indicator of the quality of the data. Of those households that did report travel, most reporting making 15 trips or less (78%), but 11% reported making more than 20 trips during their assigned 24-hour period.

FIGURE 15: HOUSEHOLD TRIP VOLUME
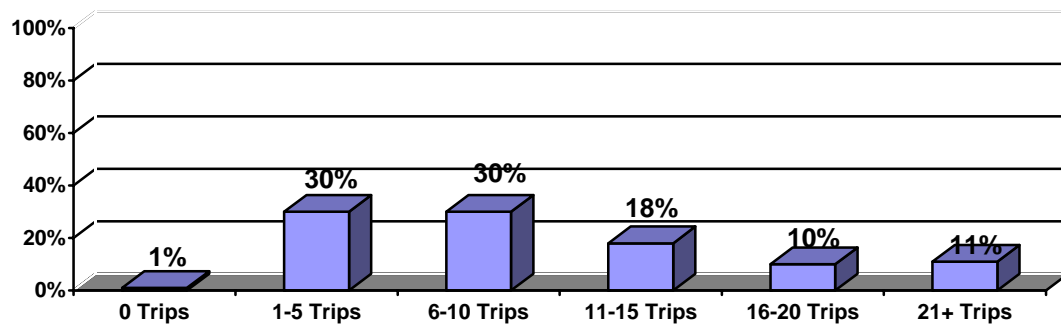
The average household daily trip rate was 10.56 trips. The average daily person trip rate for these same household members was 4.26 trips. As shown in Figure 16, households in the outlying areas reported higher average daily trip rates than those in the urban or 1st suburban ring areas. This was influenced somewhat by the proportion of larger households living in the lower density area.

FIGURE 16: TRIP RATES BY AREA
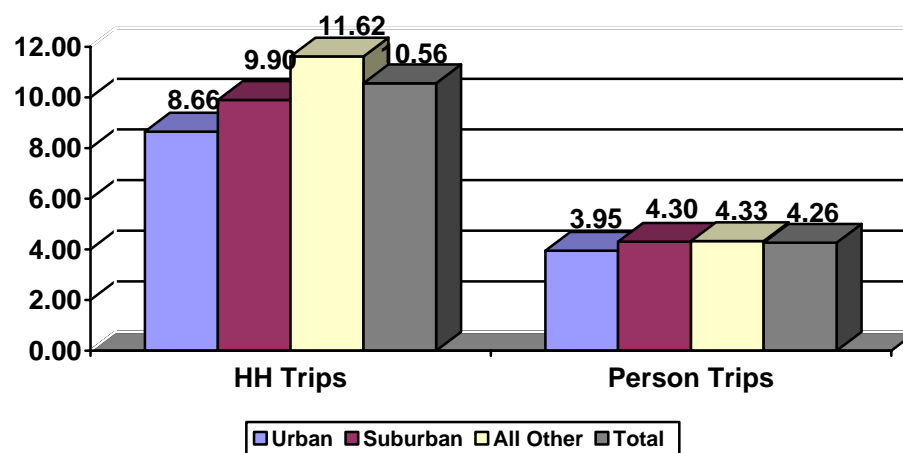
Average daily household trip rates increased as household size increased, which is a normal trend in travel survey data. The trip rates for urban households were lower, on average, then those in the other areas, across all household sizes.

FIGURE 17: TRIP RATES BY HOUSEHOLD SIZE AND AREA
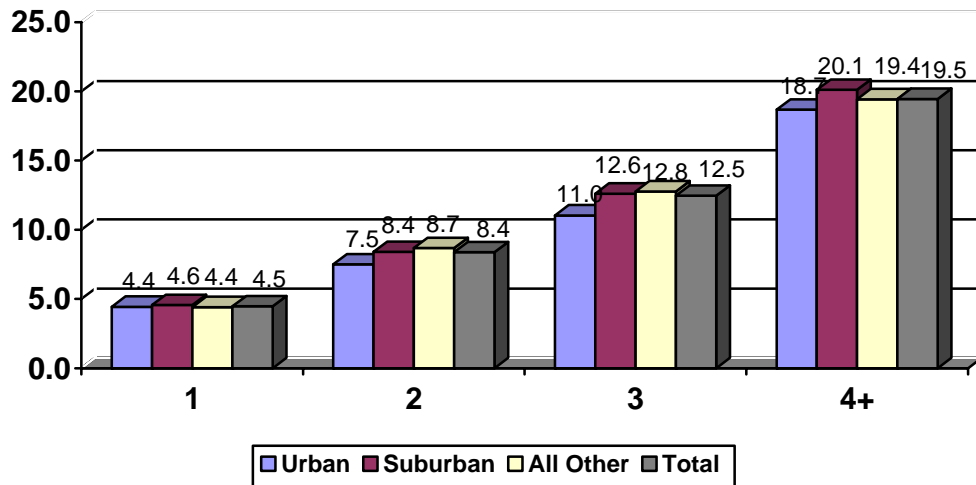
The rate of household travel also increased as vehicle ownership increased. Households with no vehicles reported 4.7 average daily household trips, ranging from 5.5 trips in the urban area down to 2.8 trips in the outlying area. The mobility rate for households with one vehicle was fairly consistent across all areas, then almost doubled for households with 2 or more vehicles.

FIGURE 18: TRIP RATES BY HOUSEHOLD VEHICLES AND AREA

Table 25 shows the average daily household trip rate for each data collection strata in terms of geography, household size, and household vehicles.

<p align="center">TABLE 25: TRIP RATES FOR HOUSEHOLD SIZE BY HOUSEHOLD VEHICLES WITHIN EACH AREA</p>
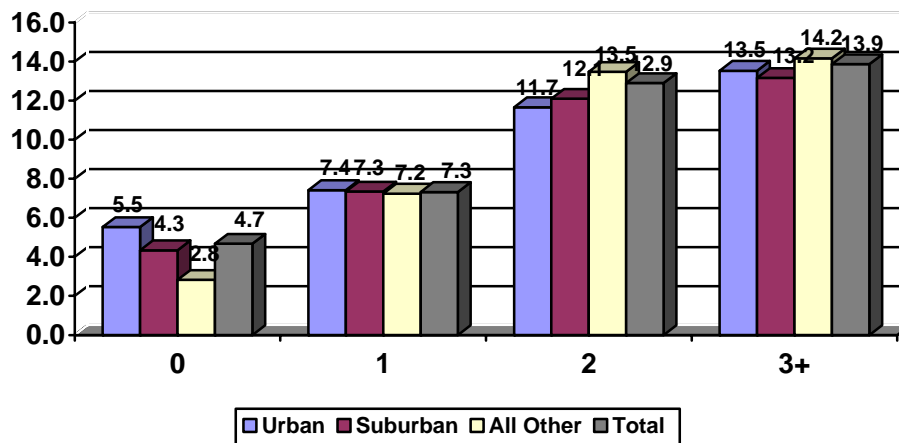
STRATUM 1 - URBAN CORE	N	HH TRIP RATE	S.E. MEAN
1-person, 0-vehicle	76	3.49	0.22
2+ persons, 0-vehicle	51	8.57	1.49
1-person, 1-vehicle	160	4.77	0.22
2-persons, 1-vehicle	64	7.10	0.50
3-persons, 1-vehicle	29	12.68	1.11
4+persons, 1-vehicle	32	16.59	1.44
1-person, 2-vehicles	16	5.05	0.78
2-persons, 2-vehicles	71	8.77	0.46
3-persons, 2-vehicles	29	10.11	1.02
4+persons, 2-vehicles	49	18.98	1.31
all persons, 3+ vehicles	52	13.53	1.19
Stratum 2 - Suburbs (First Ring)			
all households w/ 0-vehicles	52	13.53	1.19
1-person, 1-vehicle	50	4.34	0.39
2-persons, 1-vehicle	181	4.76	0.20
3-persons, 1-vehicle	79	7.87	0.54
4+persons, 1-vehicle	31	11.13	0.88
1-person, 2+ vehicles	22	21.50	2.92
2-person, 2+ vehicles	32	4.53	0.48
3-persons, 2-vehicles	195	8.76	0.36
4+persons, 2-vehicles	57	13.78	0.95
3-persons, 3+ vehicles	71	20.63	1.20
4+ persons, 3+ vehicles	35	12.65	1.11
Stratum 3 - Remainder of Area			
1-person, 0-vehicles	38	2.65	0.25
2+ persons, 0-vehicles	11	3.44	0.66
1-person, 1-vehicle	247	4.56	0.15
2-persons, 1-vehicle	110	8.33	0.43
3-persons, 1-vehicle	40	13.03	1.29
4+persons, 1-vehicle	39	15.24	1.40
1-person, 2+ vehicles	49	5.14	0.49
2-persons, 2-vehicles	331	8.95	0.23
3-persons, 2-vehicles	143	12.64	0.51
4-persons, 2-vehicles	285	20.23	0.62
2-persons, 3+ vehicles	86	8.63	0.43
3 persons, 3+ vehicles	105	12.98	0.53
4+ persons, 3+ vehicles	144	18.99	0.72

Source: Kansas City Regional Household Travel Survey, weighted.

Households with 2 or more workers reported more than twice the number of trips as those without workers. Households with no workers in the outlying area traveled slightly more than similar households in the higher density urban and suburban areas. The same is true for households with only one worker. However, for households with two or more workers, those living in the 1st suburban ring reported the highest average daily household trip rate.

FIGURE 19: TRIP RATES BY HOUSEHOLD WORKERS AND AREA
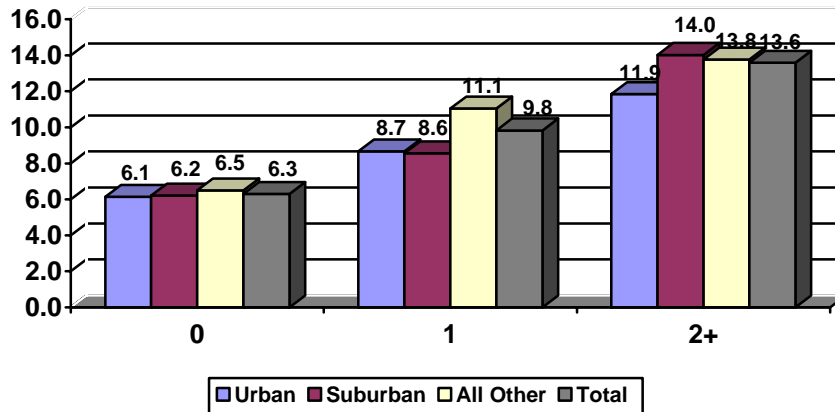
In general, household trip rates increased as income increased. The one exception is in travel by suburban households earning between $75,000 and $100,000. In that case, households reported more travel than those earning $100,000+.

TABLE 26: TRIP RATES FOR HOUSEHOLD INCOME AND REGION

HOUSEHOLD INCOME	URBAN	SUBURBAN	ALL OTHER	TOTAL
$0 - $14,999	6.73	6.57	5.98	6.47
$15,000 - $24,999	9.30	7.98	7.51	8.39
$25,000 - $34,999	8.43	8.40	8.57	8.47
$35,000 - $49,999	9.94	9.02	10.33	9.85
$50,000 - $74,999	8.37	11.46	12.61	11.76
$75,000 to $99,999	10.59	14.05	13.07	13.09
$100,000+	11.73	12.74	14.75	14.20
Refused	6.84	8.51	9.61	8.79
Total	8.66	9.90	11.62	10.56

Source: Kansas City Regional Household Travel Survey, weighted.

Person Travel. As reported earlier, the 7,570 household members reported an average daily person trip rate of 4.26. The following table summarizes the average daily person trip rates for those household members based on key demographic characteristics. Variations in travel include:

- **Gender.** On average, women reported a higher level of trip making than men. This is consistent across many travel surveys and with recent literature, as women assume more of the childcare and household responsibilities.
- **Age**. Average daily person trip rates increased with age until the 35-44 year old group, then declined. Travel by children under the age of 16 was fairly consistent across the study area, averaging 3.51 trips per person per day. Young adults (between the ages of 16 and 24) living in the 1st suburban ring reported the most travel for that age group.
- **Ethnicity**. The person trip rates shown in Table 27 for both Hispanic origin and ethnicity are for the main household respondent rather than all household members. With regard to Hispanic origin, trip rates by Hispanics in the 1st suburban ring were lower than those reported by non-Hispanics. However, the reverse is true in the urban and outlying regions, where Hispanic travel is higher. In terms of ethnicity, non-minority travelers reported making more person trips than minorities.
- **Worker Status**. Across the study area, respondents who were employed reported one trip more, on average, than those that were not employed.
- **Student Status**. There was little variation in travel for students compared to non-students. In general, students reported fewer trips than non-students.

TABLE 27: AVERAGE DAILY PERSON TRIP RATES

		URBAN	SUBURBAN	ALL OTHERS	TOTAL
	TOTAL	3.95	4.30	4.33	4.26
Gender	Male	3.77	4.06	4.20	4.09
	Female	4.10	4.50	4.45	4.40
Age	Younger than 16	3.51	3.43	3.53	3.51
	16-19	3.64	4.19	3.99	3.95
	20-24	3.46	4.13	3.78	3.82
	25-34	4.40	3.99	4.28	4.24
	35-44	4.56	5.17	5.31	5.16
	45-54	4.03	5.25	4.87	4.81
	55-64	4.43	4.73	4.52	4.55
	65+	3.62	4.00	4.30	4.04
Hispanic Origin	Yes	4.74	4.66	5.41	5.02
	No	4.64	4.94	5.05	4.94
Ethnicity	White	4.72	5.02	5.13	5.04
	African American	4.28	4.29	4.40	4.30
	Asian	4.83*	5.22*	2.95*	4.17*
	Native American	3.00*	--	4.28*	3.91*
	Other (specify)	5.30	4.47	4.15	4.65
Worker Status	Yes	4.49	4.97	4.86	4.83
	No	3.41	3.67	3.96	3.75
Student Status	Yes	3.60	3.89	3.86	3.82
	No	4.09	4.46	4.55	4.44

Source: Kansas City Regional Household Travel Survey, weighted. *denotes less than 20 observations.
–denotes no observations.

TRIP CHARACTERISTICS

While the previous section focused on the characteristics of the travelers, the purpose of this section is to present the characteristics of the 32,211 trips reported as part of the Kansas City Regional Household Travel Survey. Trip data included in this section are: the main reason for travel, travel mode, and origin-destination flows by trip purpose. In addition, details specific to households with no vehicles are presented.

Table 28 shows the distribution of trips by the main reason for traveling as well as the mean travel time for each activity. A map of all trip destinations located within the study area is shown in Figure 20. In terms of reasons for travel, one-third (34%) of all trips were to return home from a non-home location for reasons other than to work at home. The next highest reported trip purpose was to go to work (11%), followed by travel for personal business (9%) and shopping (9%). These three trip purposes were the most reported across all geographies.

The average reported trip length was 24 minutes. The longest trips were those involving transit transfers ("change mode of travel" - 24 minutes), work-related (23 minutes), and entertainment (23 minutes). The shortest were for "quick stops" at the ATM or gas stations (11 minutes), picking up or dropping off at school (12 minutes), and eating out (14 minutes).

TABLE 28: REASONS FOR TRAVELING BY AREA

MAIN ACTIVITY AT DESTINATION	N	GEOGRAPHIC AREA			TOTAL	MEAN TRAVEL TIME	MEAN DISTANCE*
		Urban	Suburban	All Others			
Non-Work At Home Activities	11030	34.8%	34.2%	34.1%	34.2%	17.29	4.75
Work	3689	10.4%	11.3%	11.8%	11.4%	20.27	7.90
Personal Business	2932	10.8%	9.5%	8.5%	9.1%	17.12	4.81
Shopping	2732	8.5%	8.8%	8.3%	8.5%	14.18	3.88
School	1889	6.1%	5.2%	6.1%	5.9%	15.64	3.07
Eat Meal	1600	3.8%	5.3%	5.2%	5.0%	13.54	3.95
Pick-Up Or Drop-Off Passenger At School	1565	4.4%	4.2%	5.2%	4.9%	11.72	3.38
Pick-Up Or Drop-Off At Other Location	1390	4.2%	4.3%	4.4%	4.3%	14.89	4.73
Visit	1011	3.5%	3.4%	3.0%	3.1%	21.90	4.44
Quick Stop	986	3.2%	3.4%	2.9%	3.1%	11.27	3.50
Work-Related	913	2.1%	3.0%	3.0%	2.8%	22.93	7.28
Recreation Or Fitness	794	1.7%	2.7%	2.6%	2.5%	16.03	3.89
Civic Or Religious	478	1.5%	1.7%	1.4%	1.5%	15.44	4.62
Entertainment	344	.7%	.9%	1.3%	1.1%	22.58	6.29
Change Mode Of Transportation	279	2.7%	.5%	.5%	.9%	24.40	4.31
Pick-Up Or Drop-Off Passenger At Work	265	1.2%	.9%	.7%	.8%	17.26	5.96
School Related	150	.3%	.5%	.5%	.5%	19.47	4.37
Work At Home	117	.2%	.3%	.4%	.4%	16.47	4.81
Other	45	.1%	.2%	.1%	.1%	16.74	4.94
Refused	1		.0%		.0%	25.00	6.00
TOTAL	32211	100.0%	100.0%	100.0%	100.0%	24.24	4.86

Source: Kansas City Regional Household Travel Survey, weighted. *Distance is in miles.
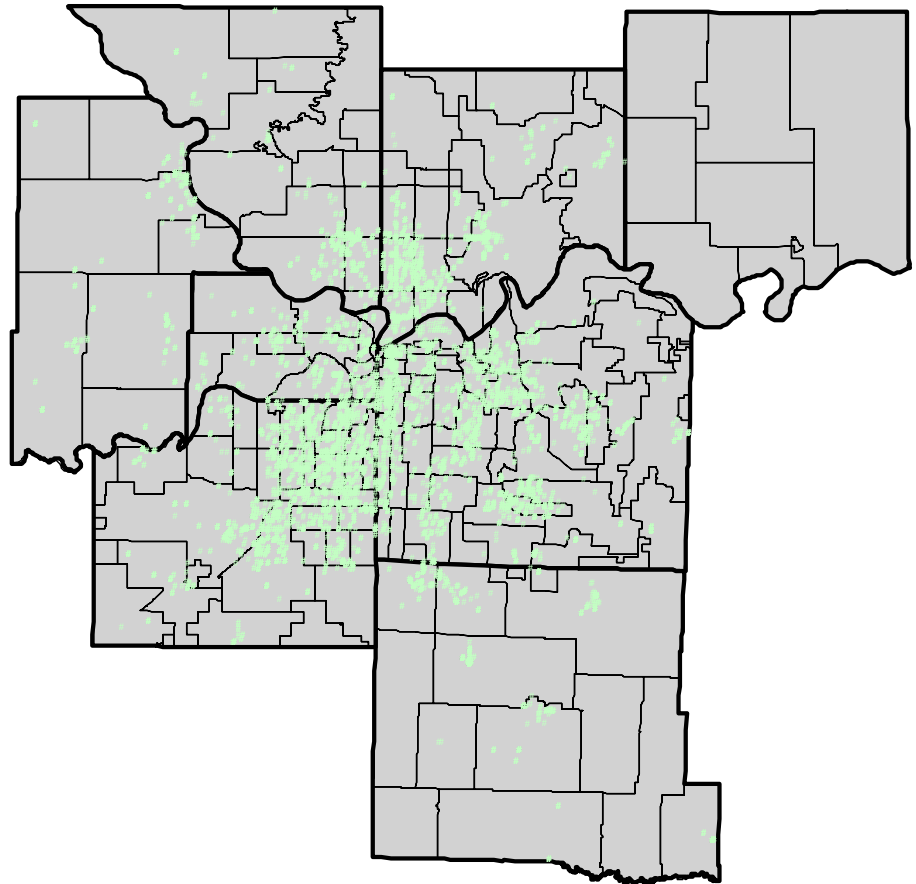
The typical modeling process looks at trips based on three main trip purposes: home-based work, home-based other, and non-home based trips. The reasons reported for travel (as shown in Table 28) were re-classified into the three trip purpose categories based on the following definitions:

- Home-based Work (HBW): All trips that start at the home location and end at the work location (or vice versa) with no stops in between.

- Home-based Other (HBO): All trips that start at the home location and end at any non-work location (or vice versa).

- Non-Home Based trips (NHB): All trips that start and end at a non-home location.

These trip purposes and their associated definitions are standard for most modeling purposes. The unlinked trip segments were reclassified into these three trip categories and the results are shown in Figure 21. As indicated there, 15% of all reported trips were HBW, 55% HBO, and 30% NHB with virtually no difference across geography.

FIGURE 21: TRIP PURPOSE BY AREA OF RESIDENCE

	HBW	HBO	NHB
Urban	14%	56%	30%
Suburban	14%	55%	31%
All Other	15%	55%	30%
Total	15%	55%	30%
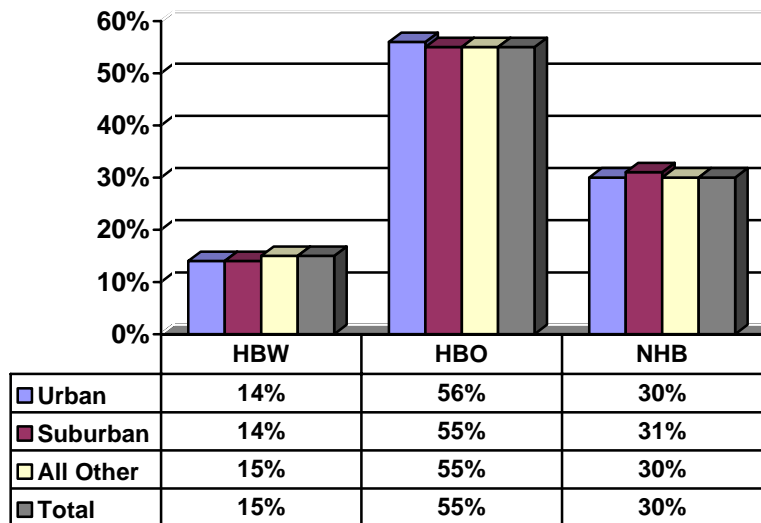
Each location visited on the travel day was assigned an electronic coordinate to help pinpoint its location geographically within the region. The next four tables show the travel between the three areas (urban, suburban, all others) for all origins and destinations that either begin or end within the region, for all trip purposes, then for specifically HBW, HBO, and NHB trips. For each table, the trip origin is listed in the left hand column and the trip destinations appear in the remaining columns. The cell percentages reflect the proportion of trips that begin in each specific origin area and where they end. For example, in Table 29, 63% of trips that begin in an urban area also end in an urban area, while 19% begin in an urban area and end in a suburban area and 16% begin in an urban area and end in an outlying region.

TABLE 29: ORIGINS AND DESTINATIONS OF TRAVEL FOR ALL TRIPS

ORIGIN	N	DESTINATION				TOTAL
		Urban	Suburban	All Other	Not Geocoded	
Urban	6282	63.1%	19.3%	15.8%	1.8%	100.0%
Suburban First Ring	7746	15.1%	54.0%	29.3%	1.7%	100.0%
All Other	17546	5.9%	12.9%	79.3%	1.9%	100.0%
Not Geocoded	637	17.1%	18.1%	50.4%	14.4%	100.0%
TOTAL	32211	19.5%	24.1%	54.3%	2.1%	100.0%

Source: Kansas City Regional Household Travel Survey, weighted. Includes all trips for all trip purposes.

TABLE 30: ORIGINS AND DESTINATIONS OF TRAVEL FOR HBW TRIPS

| ORIGIN | N | DESTINATION | | | | TOTAL |
		Urban	Suburban	All Other	Not Geocoded	
Urban	1081	43.7%	22.1%	33.3%	.9%	100.0%
Suburban First Ring	1006	24.7%	29.8%	43.4%	2.2%	100.0%
All Other	2538	15.9%	16.7%	65.5%	1.8%	100.0%
Not Geocoded	69	21.7%	26.1%	52.2%	--	100.0%
TOTAL	4695	24.3%	20.9%	53.2%	1.7%	100.0%

Source: Kansas City Regional Household Travel Survey, weighted. Includes all trips for all travel between home and work with no stops. (N=4,695 trips)

TABLE 31: ORIGINS AND DESTINATIONS OF TRAVEL FOR HBO TRIPS

| ORIGIN | N | DESTINATION | | | | TOTAL |
		Urban	Suburban	All Other	Not Geocoded	
Urban	3035	70.7%	18.3%	9.7%	1.3%	100.0%
Suburban First Ring	4393	13.0%	60.2%	25.5%	1.3%	100.0%
All Other	9974	3.3%	11.8%	83.4%	1.5%	100.0%
Not Geocoded	279	17.9%	23.7%	58.4%		100.0%
TOTAL	17681	17.5%	25.1%	56.0%	1.4%	100.0%

Source: Kansas City Regional Household Travel Survey, weighted. Includes all trips for all travel between home and a non-work location. (N=17,681 trips)

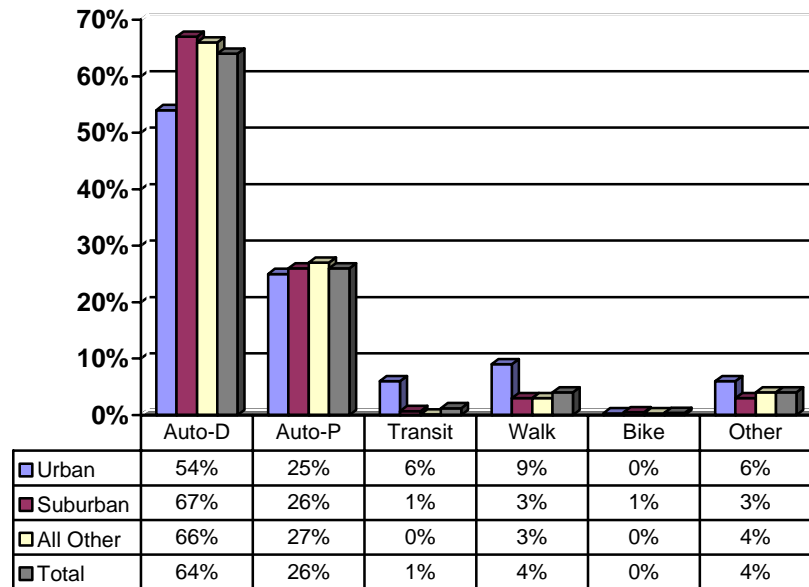### TABLE 32: ORIGINS AND DESTINATIONS OF TRAVEL FOR NHB TRIPS

| ORIGIN | N | DESTINATION | | | | TOTAL |
		Urban	Suburban	All Other	Not Geocoded	
Urban	2166	62.2%	19.3%	15.7%	2.8%	100.0%
Suburban First Ring	2346	14.8%	52.8%	30.3%	2.2%	100.0%
All Other	5035	6.1%	13.2%	77.9%	2.8%	100.0%
Not Geocoded	288	15.0%	10.5%	42.5%	32.1%	100.0%
TOTAL	9835	20.8%	23.9%	51.8%	3.5%	100.0%

Source: Kansas City Regional Household Travel Survey, weighted. Includes all trips for all travel between two non-home locations. (N=9,835 trips)
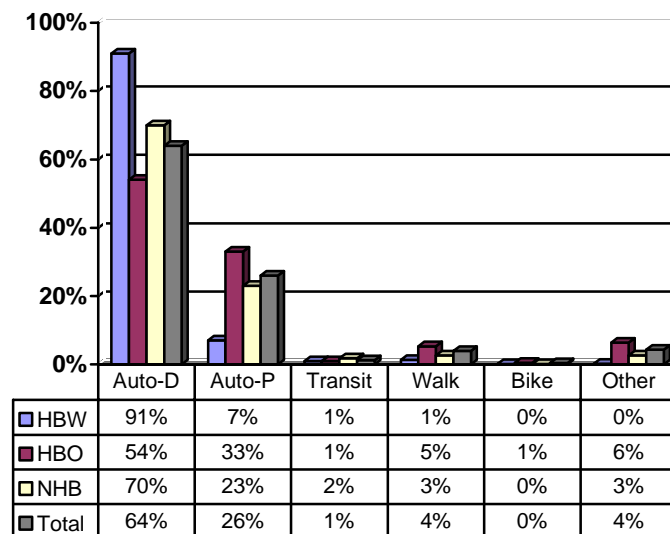
MODE CHOICE

In addition to recording trip purpose and location information, respondents were asked to record the mode of travel they used to make each trip. The distribution of trips by mode is shown in Figure 22. Auto was the dominant mode throughout the region, accounting for 90% of all trips (64% for auto drivers and 26% for auto-passengers). Transit usage was highest in the urban areas, which have the highest densities, and negligible in the outlying areas. "Other" includes school buses, taxis, and paratransit.

FIGURE 22: TRAVEL MODE BY AREA OF RESIDENCE

	Auto-D	Auto-P	Transit	Walk	Bike	Other
Urban	54%	25%	6%	9%	0%	6%
Suburban	67%	26%	1%	3%	1%	3%
All Other	66%	27%	0%	3%	0%	4%
Total	64%	26%	1%	4%	0%	4%

The distribution of travel mode by trip purpose is shown in Figure 23. The highest proportion of auto-driver trips was for home-based work trips, while the highest proportion of auto passenger trips was for home-based other trips. The highest proportion of walk trips were for home-based other purposes.

FIGURE 23: TRAVEL MODE BY TRIP PURPOSE

	Auto-D	Auto-P	Transit	Walk	Bike	Other
HBW	91%	7%	1%	1%	0%	0%
HBO	54%	33%	1%	5%	1%	6%
NHB	70%	23%	2%	3%	0%	3%
Total	64%	26%	1%	4%	0%	4%

Trip duration varied by mode and region. As shown in Table 33A, the average trip length was 17 minutes. Walk trips had the shortest average duration of 12 minutes, while transit had the longest (26 minutes).

TABLE 33A: TRIP DURATION BY AREA OF RESIDENCE AND MODE

MODE	URBAN	SUBURBAN	ALL OTHER	TOTAL
Auto Driver	16.79 min	16.42 min	17.52 min	17.14 min
Auto Passenger	17.11 min	14.95 min	14.61 min	15.10 min
Transit	23.93 min	31.54 min	35.50 min*	25.50 min
Walk	12.36 min	12.85 min	10.16 min	11.49 min
Bike	15.18 min*	20.16 min	17.46 min	18.10 min
Other	26.04 min	23.82 min	27.12 min	26.27 min
Total	17.44 min	16.31 min	16.96 min	16.88 min

Source: Kansas City Regional Household Travel Survey, weighted. *denotes less than 20 observations

The average trip distance was 4.9 miles. Trips in the outlying region were longer than those in the urban and suburban areas (5.2 miles compared to 4.6 miles urban and 4.3 miles suburban).

TABLE 33B: TRIP DISTANCE BY AREA OF RESIDENCE AND MODE

MODE	URBAN	SUBURBAN	ALL OTHER	TOTAL
Auto Driver	5.7 miles	4.7 miles	6.0 miles	5.6 miles
Auto Passenger	4.1 miles	3.9 miles	4.1 miles	4.1 miles
Transit	0.5 miles	0.6 miles	0.8 miles	0.6 miles
Walk	3.2 miles*	1.0 miles	1.5 miles*	1.5 miles
Bike	3.0 miles	4.9 miles	12.8 miles*	3.6 miles
Other	2.9 miles	3.4 miles	2.9 miles	3.0 miles
Total	4.6 miles	4.3 miles	5.2 miles	4.9 miles

Source: Kansas City Regional Household Travel Survey, weighted. *denotes less than 20 observations

Travel by Households with No Vehicles.   The final data set includes 226 households that reported having no vehicles available to them.   The purpose of this section is to review the travel patterns for this group of households as compared to households that do have vehicles available to them as the mobility needs of the "autoless" are important to consider in policy-making activities. Table 34 shows where 0-vehicle households are located in comparison to households with vehicles. Most 0-vehicle households live in the urban area (56% compared to 18% of households with vehicles), while 56% of households with vehicles live in the outlying areas compared to 22% of 0-vehicle households.

TABLE 34: LOCATION OF HOUSEHOLDS WITH AND WITHOUT VEHICLES

GEOGRAPHIC AREA	0-VEHICLE HOUSEHOLDS	HOUSEHOLDS WITH VEHICLES	TOTAL
Urban	56.0%	17.8%	20.6%
Suburban 1st ring	22.2%	26.3%	26.0%
All other	21.8%	55.9%	53.4%
TOTAL	100.0%	100.0%	100.0%

Source: Kansas City Regional Household Travel Survey, weighted.

Zero-vehicle households reported half the number of home-based work trips as compared to households with vehicles and more home-based other trips than households with vehicles.

TABLE 35: TRIP PURPOSES FOR HOUSEHOLDS WITH AND WITHOUT VEHICLES

TRIP PURPOSE	0-VEHICLE HOUSEHOLDS	HOUSEHOLDS WITH VEHICLES	TOTAL
HBW	7.5%	14.8%	14.6%
HBO	66.9%	54.5%	54.9%
NHB	25.6%	30.7%	30.5%
TOTAL	100.0%	100.0%	100.0%

Source: Kansas City Regional Household Travel Survey, weighted.

People residing in households with no vehicles are much more likely to use transit or walk to their destinations. As shown in Table 36, 34% of all travel was as an auto passenger, 26% using transit, and 26% walking. The small proportion of "auto-driver" trips reflects where respondents borrowed a non-household member's vehicle.

TABLE 36: TRAVEL MODES FOR HOUSEHOLDS WITH AND WITHOUT VEHICLES

TRAVEL MODE	0-VEHICLE HOUSEHOLDS	HOUSEHOLDS WITH VEHICLES	TOTAL
Auto-driver	1.3%	66.3%	64.1%
Auto-passenger	34.2%	25.8%	26.1%
Transit	25.8%	0.4%	1.2%
Walk	23.4%	3.3%	3.9%
Bike	0.5%	0.3%	.4%
Other	14.9%	4.0%	4.3%
TOTAL	100.0%	100.0%	100.0%

Source: Kansas City Regional Household Travel Survey, weighted.

TRAVEL TIMES

All respondents were asked to record the arrival and departure times for all locations visited during the designated 24-hour travel period. All travel days began at 3 a.m. and ended at 2:59 a.m. the next day. As shown in Figure 24, most trip departures took place between 6 a.m. and 8 p.m. Travel peaked at 7 a.m., declined then picked up slightly at noon. The PM peak occurred between 3 and 5 p.m. when 27% of all trip departures were recorded.

FIGURE 24: TRIP DEPARTURE TIMES
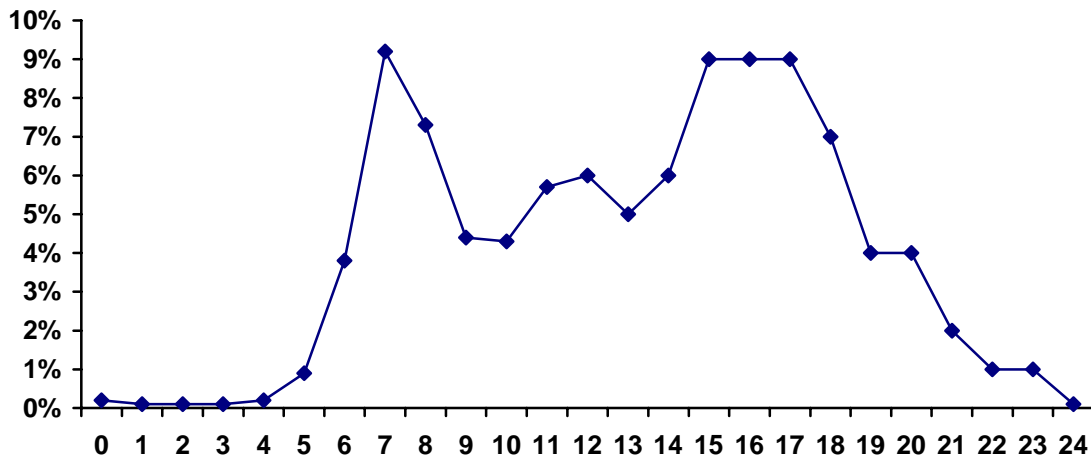
The departure times can be grouped into time slots, representing travel in the morning, mid-day, afternoon, evening, and late at night. The following is a distribution of trips based on these travel time categories. Thirty-seven percent of all travel occurred between the mid-day hours of 10 am to 3:59 pm, while 30% occurred from 4 to 7:59 pm. The maps on the following pages show the travel destinations throughout the day, within these same time periods.
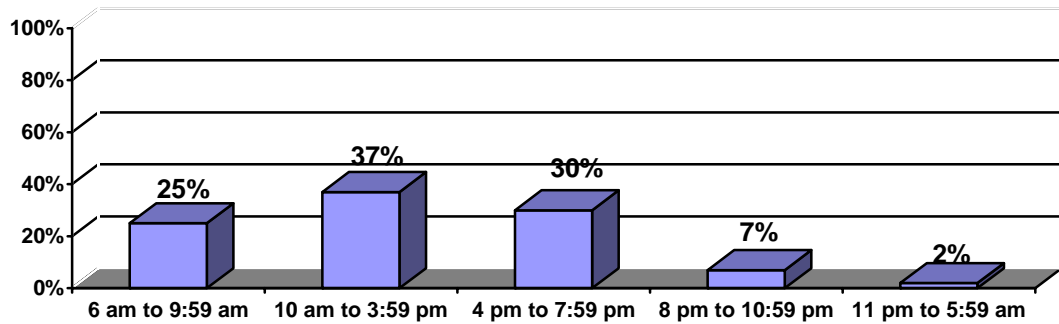
FIGURE 25: TRAVEL BY TIME OF DAY

FIGURE 26: DESTINATIONS VISITED BETWEEN 6 AM AND 9:59 AM
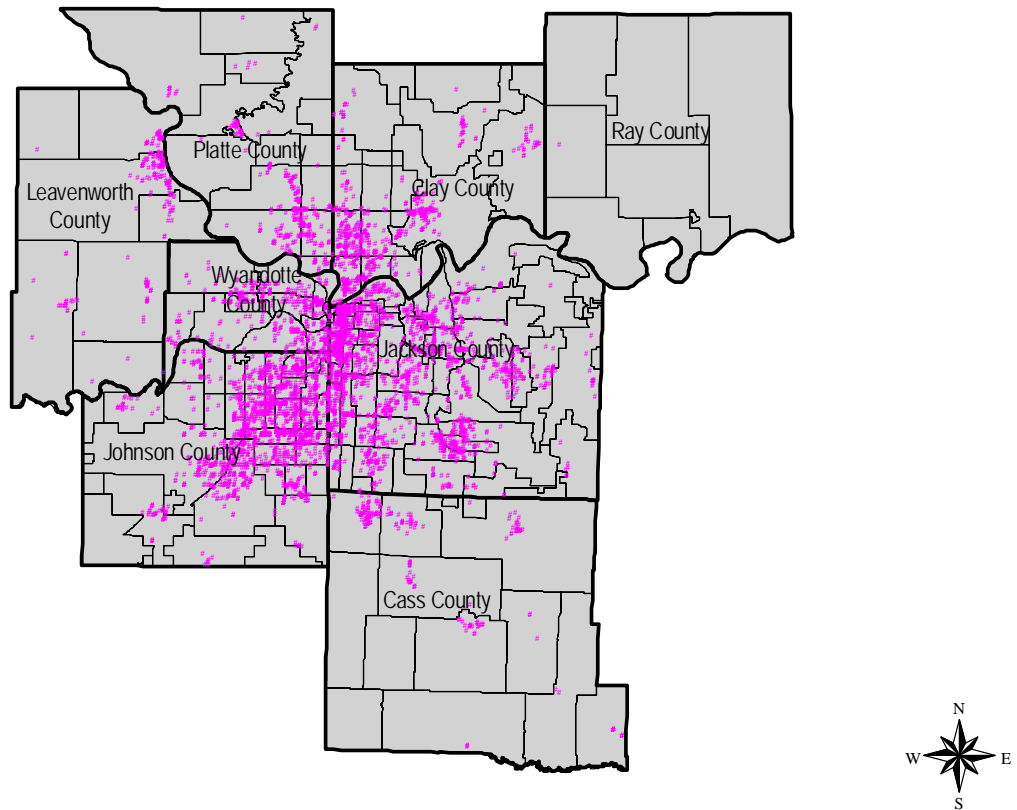
AM Peak Destinations
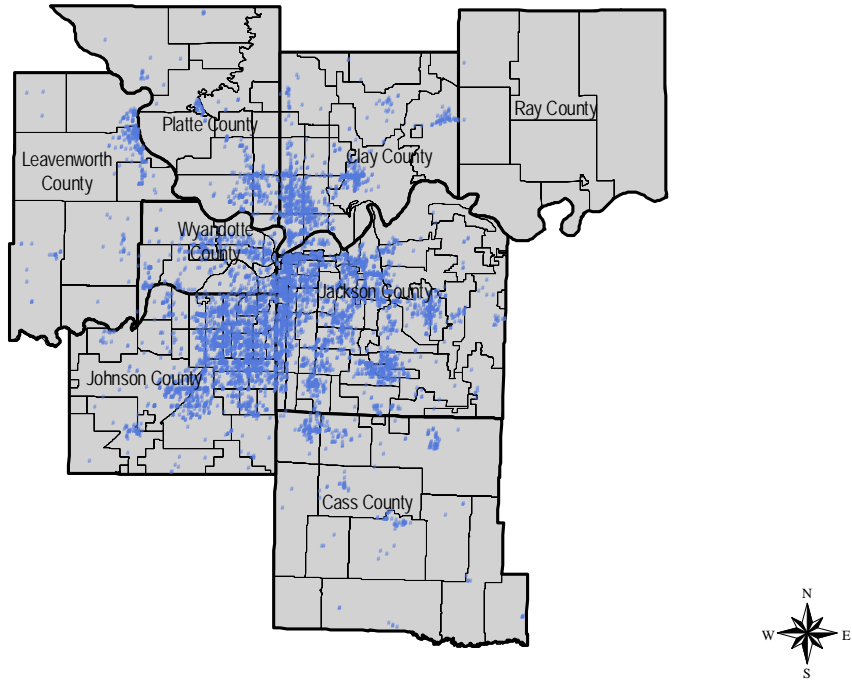
Mid-day Destinations

PM Peak Destinations

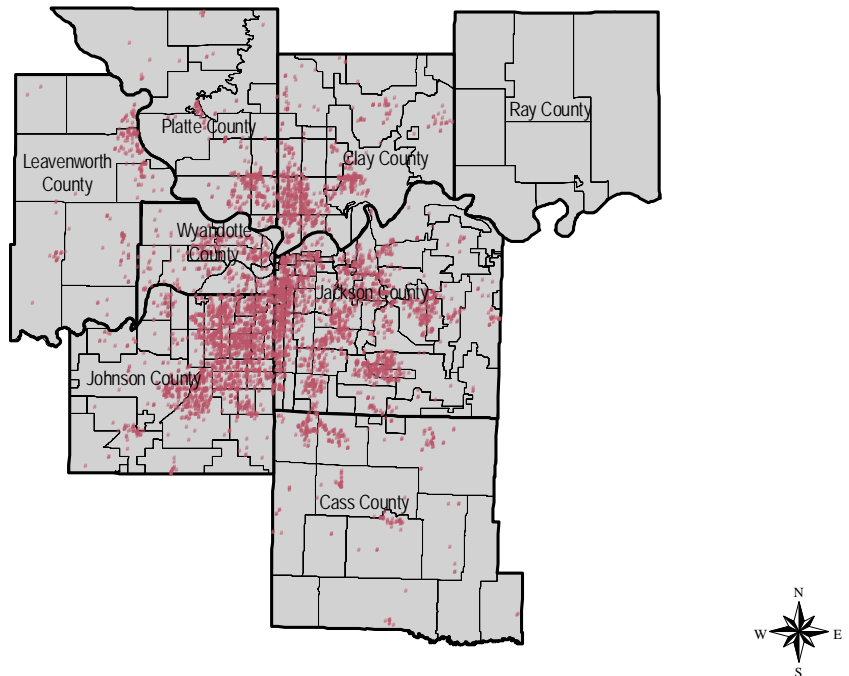FIGURE 29: DESTINATIONS VISITED BETWEEN 8 PM AND 10:59 PM
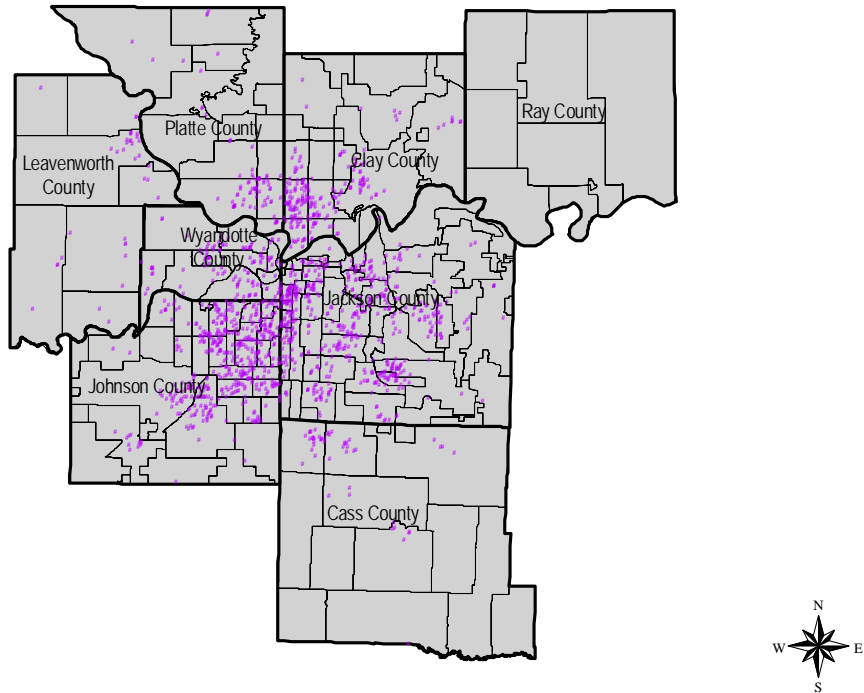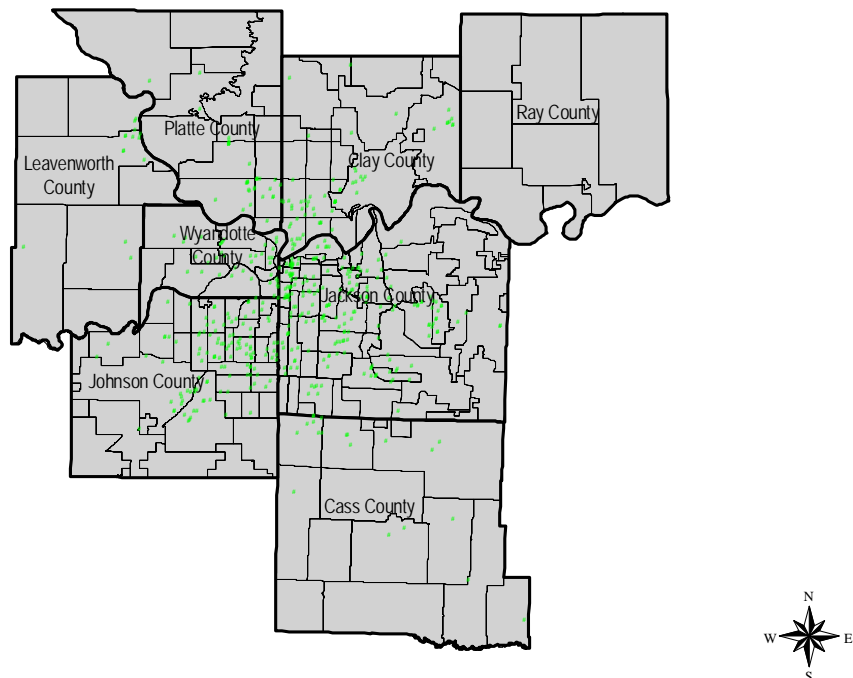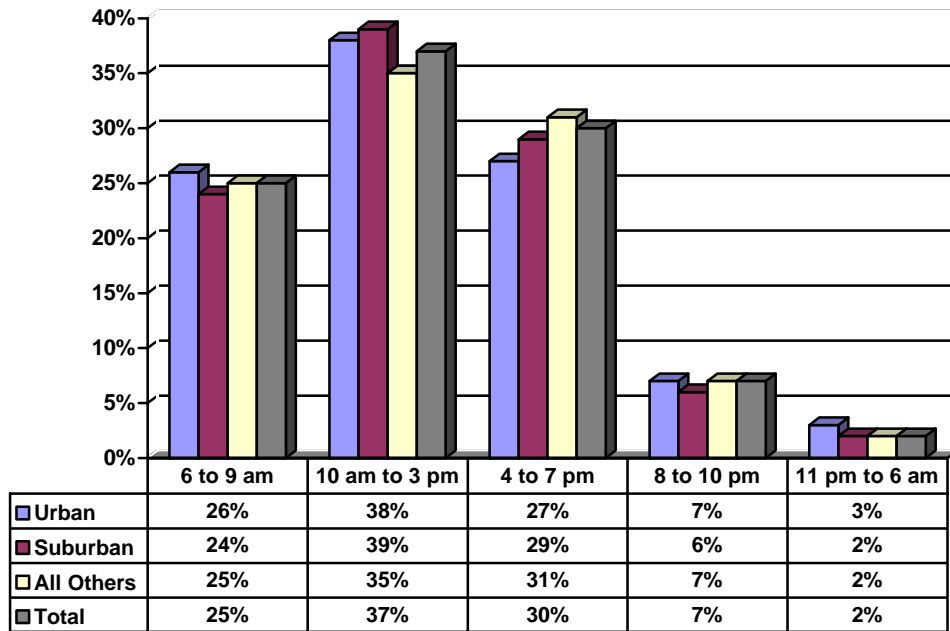
Evening Destinations

FIGURE 30: DESTINATIONS TRAVELED TO BETWEEN 11 PM AND 5:59 AM

Other Destinations

The proportion of trips made during these time periods showed little variation in the times of day travel was made when household location was considered.

FIGURE 31: TRAVEL BY TIME OF DAY AND AREA OF RESIDENCE

	6 to 9 am	10 am to 3 pm	4 to 7 pm	8 to 10 pm	11 pm to 6 am
■Urban	26%	38%	27%	7%	3%
■Suburban	24%	39%	29%	6%	2%
□All Others	25%	35%	31%	7%	2%
■Total	25%	37%	30%	7%	2%

There was noticeable variation in the distribution of trips by purpose throughout the day. HBW trips (directly from home to work or vice versa with no stops) were mainly recorded in the morning period (39%). During the afternoon peak period, HBW trips were lower (28%) but HBO trips were higher (34%), indicating that respondents made more stops on the way home from work. NHB trips were greatest in the mid-day time period.

FIGURE 32: TRAVEL BY TIME OF DAY AND TRIP PURPOSE

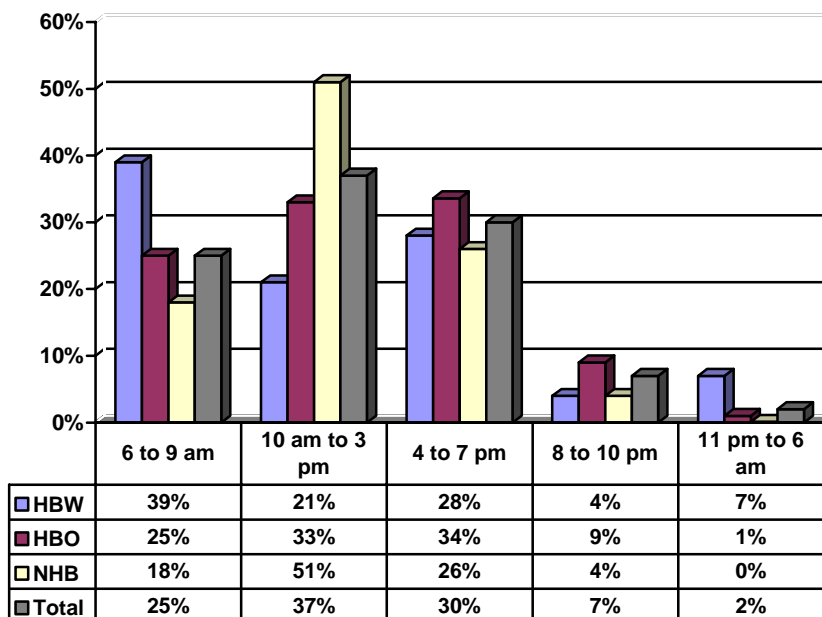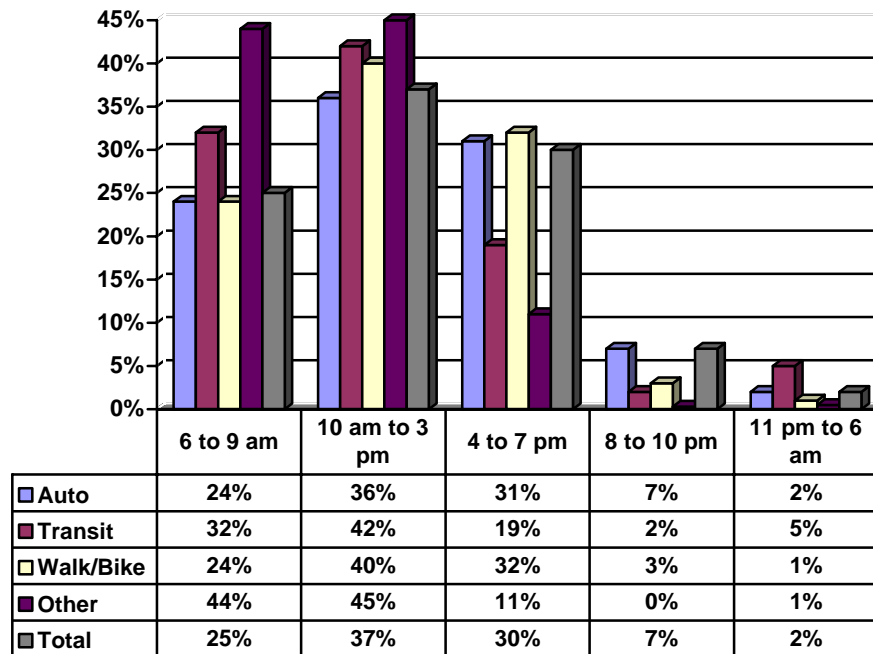|	6 to 9 am	10 am to 3 pm	4 to 7 pm	8 to 10 pm	11 pm to 6 am
■HBW	39%	21%	28%	4%	7%
■HBO	25%	33%	34%	9%	1%
□NHB	18%	51%	26%	4%	0%
■Total	25%	37%	30%	7%	2%

Figure 33 shows the variation in travel mode usage by time of day. Of particular interest is the large increase in walk/bike trips during the mid-day period (40% of all non-motorized travel was reported at that time). The large number of "other" trips in the AM and mid-day peaks reflects school bus trips.

FIGURE 33: TRAVEL BY TIME OF DAY AND MODE

	6 to 9 am	10 am to 3 pm	4 to 7 pm	8 to 10 pm	11 pm to 6 am
■ Auto	24%	36%	31%	7%	2%
■ Transit	32%	42%	19%	2%	5%
□ Walk/Bike	24%	40%	32%	3%	1%
■ Other	44%	45%	11%	0%	1%
■ Total	25%	37%	30%	7%	2%

The 2004 household travel survey is the third comprehensive study of travel patterns in the region. The prior studies were conducted in 1970 and 1990. The purpose of this section is to compare the 2004 survey results with those from the 1990 survey (the 1970 results were not available). The first portion of this chapter compares the 1990 and 2004 surveys in terms of the methods and design features, both of which have an impact on the results. In the second part of this section, a limited comparison of the results is presented.

Using the details from the 1990 Regional Travel Survey report, the survey methods and design attributes were compared between the two studies. The results are shown in Table 37. The 1990 survey had a more limited geographic scope than the 2004 survey, and did not have the technological advances available today.

TABLE 37: SURVEY METHODS AND DESIGN FEATURES

METHOD/DESIGN FEATURE	1990 SURVEY	2004 SURVEY
Study Area	All of Clay, Platte, Jackson, Johnson and Wyandotte counties, the NW portion of Cass County, and the SE portion of Leavenworth County	All of Cass, Clay, Jackson, Johnson, Leavenworth, Platte, and Wyandotte counties
Survey Method	Telephone Recruitment, Mail-back Retrieval	CATI Telephone Recruitment, CATI Telephone Retrieval, GPS
Eligible Participants	All household members age 1+	All household members regardless of age
Survey Administration	Fall 1990	Spring 2004
Travel Days	Tuesday, Wednesday, and Thursday	Monday through Friday
Sample Size	1,029 (1,221 in data set)	3,000 (3,049 in data set)
Data Collection Targets	Geography (county), Household Size by Household Income	Geography (density areas), Household Size by Household Vehicles
Approach	Trip Diary	Place-based Travel Log

The following table presents a limited comparison of the survey results. Specifically, the 1990 results as presented in that study's final report are compared with the 2004 results, both for the full data set as well as a subset of responses that are the most comparable to the 1990 results as possible. The 2004 restricted results exclude Cass and Leavenworth county households, travel for household members under the age of 1, and travel that occurred on Monday or Friday. In addition, the 2004 results presented here are unweighted, as the 1990 report did not indicate those data were weighted.

Participating households in the two surveys were different in several important characteristics. First, the 2004 households were smaller, on average, than those surveyed in 1990 (2.4 vs. 2.8). This contributed to a lower trip rate. Second, the proportion of employed respondents age 18+ was higher in the 2004 survey (74% in 2004 vs. 69% in 1990). Third, the 1990 survey contained more 0-trip households (2.3% compared to less than 1% in the 2004 survey), but fewer 0-vehicle households (4% compared to 5% in 2004).

In terms of reported travel, auto was the dominant mode in 1990 and it remains that way in 2004. In 1990, 66% of trips were by auto-driver and 25% as auto-passenger (for a total of 91%). In 2004, 92% of comparable households reported travel by auto. The proportion of walk/bike trips remained the same from 1990 to 2004, for similar households. It actually increased for the 2004 sample as a whole. Finally, the travel time distributions remained largely the same.

TABLE 38: COMPARISON OF RESULTS

CHARACTERISTICS	1990 SURVEY	2004 SURVEY (RESTRICTED RESULTS)	2004 SURVEY (FULL RESULTS)
# Households	1,221	1,740	3,049
# Persons	3,397	4,204	7,400
# Trips	14,610	18,171	31,779
Average HH Trips	12.0	10.4	10.4
Average HH Size	2.8	2.4	2.4
% employed (age 18+)	69%	74%	74%
# 0-trip households	2.3%	0.8%	0.9%
% 0-vehicle households	4% (mostly Wyandotte County)	5.1% (mostly Jackson County)	5.3% (mostly Jackson County)
Mode of Travel			
Driver	65.9%	67.6%	64.1%
Passenger	24.8%	24.5%	26.1%
Bus	0.9%	0.9%	1.2%
Taxi	0.1%	0.2%	0.3%
School Bus	4.4%	3.0%	3.7%
Walk/Bike	3.4%	3.5%	4.3%
Other (includes heavy truck)	0.5%	0.3%	0.3%
Travel by Time of Day			
12:00 – 5:59 AM	1.6%	1.3%	1.4%
6:00 AM	3.6%	3.7%	3.8%
7:00 AM	8.5%	9.0%	9.1%
8:00 AM	6.9%	7.1%	7.1%
9:00 AM	4.1%	4.6%	4.5%
10:00 AM	4.3%	4.3%	4.4%
11:00 AM	5.8%	5.7%	5.7%
12:00 PM	6.8%	6.2%	6.1%
1:00 PM	5.4%	5.2%	5.1%
2:00 PM	6.2%	5.9%	6.4%
3:00 PM	9.7%	8.9%	9.1%
4:00 PM	8.8%	9.0%	9.1%
5:00 PM	8.9%	9.4%	9.4%
6:00 PM	6.9%	7.3%	7.4%
7:00 PM	4.7%	4.4%	4.3%
8:00 PM	3.4%	4.0%	3.6%
9:00 – 11:59 PM	4.3%	3.7%	3.6%

CONCLUSIONS

The Kansas City Regional Household Travel Survey was conducted from October 2003 through May 2004 and provides a rich source of information about travel behavior in the region. Sponsored by the Mid-America Regional Council and the Kansas and Missouri Departments of Transportation, this study details the travel and activities of 3,049 participating households from throughout the metropolitan Kansas City area.

The study was conducted using standard household travel survey methods. This included the use of an advance notification brochure (to advise households they were randomly selected for inclusion in the study), telephone recruitment, placement of respondent materials (including travel logs for all household members) via US mail, telephone retrieval, continuous data processing and geocoding, and fine-tuned quality assurance data checks. The study did not provide any incentives to the households, who spent an average of 44 minutes for the two telephone interviews and 20 minutes completing the travel logs. The overall response rate (calculated according to CASRO standards) was 36%.

The Kansas City Regional Household Travel Survey obtained demographic and travel behavior details for 3,049 regional households, including their 7,400 household members and 5,604 vehicles. They also provided trip destinations, travel times, travel modes, and the reasons for making 31,779 trips during a 24-hour period. When expanded to the survey universe, the travel data represents 655,197 households, 1,626,554 persons, 1,150,769 vehicles, and 6,899,951 trips. In all, the households reported an average of 10.6 daily household trips and 4.3 daily person trips (for all household members).

Most respondents reported traveling by auto (90%). The survey data also includes a small number of households with no vehicles (226), who mainly relied on transit and walking to meet their mobility needs. Common trip purposes for all respondents included work, personal business and shopping, in addition to "returning home" from other locations. The average reported trip length was 24 minutes. The longest trips were for changing mode of travel (24 minutes), work-related travel (23 minutes), and entertainment (23 minutes). The shortest was for "quick stops" at the ATM or gas stations (11 minutes), picking up or dropping off passengers at school (12 minutes) and eating out (14 minutes).

In the fourth section of this report, the 2004 survey results were compared to those from the 1990 survey. To account as best possible for methodological and specification differences between the two surveys, the 2004 survey results were filtered to exclude respondents who recorded travel on Monday or Friday, lived in Cass or Leavenworth counties, or were babies (under the age of 1). The 2004 survey contained smaller households as compared to the 1990 survey, and therefore had a lower overall average daily household trip rate. However, in both surveys, auto was the dominant choice of travel modes and travel by time of day remained relatively the same.

In conclusion, the data set produced as a result of the Kansas City Regional Household Travel Survey represents a comprehensive summary of regional travel behavior for the transportation planning efforts of the Mid-America Regional Council and others in the transportation planning community. The survey approach, combined with careful planning at the start of the project and continuous quality assurance efforts during data collection, have resulted in a high quality data set that will be useful in future model development efforts as well as general planning needs.

APPENDICES