STATE HIGHWAY ADMINISTRATION

RESEARCH REPORT

TRIP GENERATION STUDIES FOR SPECIAL GENERATORS

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MORGAN STATE UNIVERSITY

Project number MD-09-SP808B4J
FINAL REPORT

December 2009

Technical Report Documentation Page

Report No. MD-09-SP808B4J	2. Government Accession No.	3. Recipient's Catalog No.
4. Title and Subtitle Trip Generation Studies for Special Generators		5. Report Date September 2009 6. Performing Organization Code
7. Author/s Mansoureh Jeihani and Ricardo Camilo		8. Performing Organization Report No.
9. Performing Organization Name and Address Morgan State University 1700 E. Cold Spring Lane Baltimore, MD 21251		10. Work Unit No. (TRAIS)
		11. Contract or Grant No. SP808B4J
12. Sponsoring Organization Name and Address Maryland State Highway Administration Office of Policy & Research 707 North Calvert Street Baltimore MD 21202 Morgan State University National Transportation Center 1700 East Cold Spring Lane Baltimore, MD 21251		13. Type of Report and Period Covered Final Report 14. Sponsoring Agency Code (7120) STMD - MDOT/SHA

15. Supplementary Notes

16. Abstract

This research examines the effects of town centers and senior housing developments on surrounding roadways and nearby transit. The Institute of Transportation Engineers (ITE) Trip Generation Manual, which determines number of trips produced or attracted by different developments, does not include town centers. It has also been argued that the ITE manual underestimates trip rates for senior housing. This, coupled with the prominence of these types of developments in Maryland, merits further study into their impacts on the surrounding roadway system.

17. Key Words: Trip generation, Town Centers, Senior housing developments

18. Distribution Statement: No restrictions
This document is available from the Research Division upon request.

19. Security Classification (of this report)	20. Security Classification (of this page)	21. No. Of Pages	22. Price
None	None	95	

Form DOT F 1700.7 (8-72) Reproduction of form and completed page is authorized.

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ACKNOWLEDGEMENTS

The authors would like to thank the Maryland State Highway Administration for their funding support and input throughout the study and Morgan's National Transportation Center for its funding support and continued encouragement of student participation in research projects.

The following students played an important role in the collection and analysis of data, and their work is appreciated: Abdrahamane Traore, Onan Marroquin and Hooman Mazloomdoost. We would also like to acknowledge the clerical assistance provided by Alice R. Williams and the editorial assistance provided by Erica Johnson.

We also thank the owners and managers of the nine developments for permitting us to conduct our study on their premises.

EXECUTIVE SUMMARY

This research examines the effects of town center and senior housing developments on surrounding roadways and nearby transit. The Institute of Transportation Engineers (ITE) Trip Generation Manual, which determines the number of trips produced or attracted by different developments, does not include town centers. It has also been argued that the ITE manual underestimates trip rates for senior housing. This, coupled with the prominence of these types of developments in Maryland, merits further study into their impact on the surrounding roadway systems.

The results verified that the ITE manual underestimates trips generated by age-restricted housing. The ITE trip rates are one-third of the calculated ones. However, the studied age-restricted developments generated 27 to 63 percent fewer trips than regular housing. The results have been sent to the ITE for incorporation in their manual.

Town centers seem to have a completely different trip generation patterns than shopping centers. Therefore, town center needs to be included as a new category in the ITE manual.

INTRODUCTION

The ITE Trip Generation Manual is a planner's main resource for determining how many vehicle trips will be added to surrounding roadways as a result of new development. This manual contains rates from a composite of trip generation studies done across the country. It is updated approximately every five years with new data from additional studies or new types of land use.

Although this resource is widely accepted as the standard for trip generation, it has several weaknesses. Since the manual draws from studies done across the country, the rates may not accurately reflect what happens here in Maryland. It is also difficult for the manual to keep up with new or unusual land use practices. We have identified town center (with or without transit access) and age-restricted housing developments as being inadequately represented by the ITE manual.

Many counties in Maryland are proposing varying degrees of town center development. The sizes of these multi-use developments vary and they may include stores, banks, restaurants and residential units. A town center can also mean different things in different jurisdictions: some carry their own zoning and some have a transit component. One of the main questions when analyzing this type of development is how many trips will utilize transit. Many reports deduct a percentage of trips that are assumed to use transit but this is done without data supporting the claim. Planners must also consider the number of internal trips (i.e., trips captured by another part of the same development).

Age-restricted housing, also referred to as retirement or senior (55 years old and older) housing, is the other land use that has become more common in Maryland. The growing demand is due to an aging population, rising incomes along with cultural and lifestyle changes. Senior housing developments consist of detached or attached independent-living units and the community amenities may include golf courses, swimming pools, security and transportation. The ITE manual has age-restricted housing in a special category but its rates are based on limited empirical data due to the relative newness of the development type.

A recent study published in the ITE Journal found that the ITE manual underestimates age-restricted housing trips (Flynn and Boenau, 2007). A study of four retirement communities in Evansville, Indiana also found that locally developed trip generation rates were higher than those published in the ITE manual (Evansville Urban Transportation Study, 2001). The Southern New Hampshire Planning Commission's report on senior housing developments matched the ITE's average trip generation rate for weekdays, Saturday and Sunday but the weekday morning and evening peak trip rates were much higher (Southern New Hampshire Planning Commission, 2007).

The ITE's current evening peak-hour trip rate for detached senior housing is approximately one-fourth that of detached single-family housing, a very low number. However, further study is needed to find if ITE manual underestimates the age-restricted housing trips.

Objectives

The main objective of this project is to determine how senior housing and town center developments affect surrounding roadways and transit. The actual trips from nine developments in Maryland — five senior housing and four town centers — were tracked for one week with counters installed at each development's entrances and exits. The traffic outside of the land uses was also counted and transit riders at the town centers were surveyed. From this research we are able to provide trip rates, equations and data plots for the two developments. In addition to reflecting Maryland-specific travel behavior, this study will help planners confronted with projecting traffic in areas with unusual land-use proposals that are inadequately addressed by the ITE manual.

LITERATURE REVIEW

The general purpose of a trip generation study is to collect and analyze data on the relationships between trips attracted and produced to and from a development, as well as the characteristics of the land use. It provides trip rates, equations and data plots based on traffic counts and characteristics of the surveyed land uses. The trip rates are appropriate for planning purposes and traffic impact studies. In order to estimate trip rates for senior housing and town centers, we followed the procedures detailed in the ITE handbook.

Site selection is critical to achieving representative and consistent trip generation rates. At least three sites in each category should be selected. According to the 2004 edition of the ITE manual, the selected sites should have at least 85 percent occupancy, been established for at least two years, be able to be isolated in order to collect the required data and have a limited number of driveways.

Transit-Oriented Development

Town centers are sometimes built as a transit-oriented development (TOD), which refers to a higher-density development with pedestrian priority that is located within walking distance of a public transit stop. TODs have the potential to boost transit ridership, increase walking, mitigate sprawl, accommodate growth and reduce vehicle traffic and its associated pollution. However, the trip generation rates in the ITE manual are generally from a vehicle-trip perspective for stand-alone suburban development even though trip generation can also be viewed from a person-oriented perspective. As a result, individual entities have had to adjust the ITE trip generation rates for mixed-use, pedestrian-oriented and transit-oriented development.

Determining the Nature of Town Center

A town center, as defined by the 1998 edition of the Baltimore County zoning regulations, is a primary center of commerce for an area with a population of 100,000 or more persons that is locally designated and delimited by the Planning Board (Greenhorne and Omara, 2005). A town center might include residential units or residential units might be located near it. As stated earlier, a town center may also have transit access.

To have a more precise estimate of trip rates, we chose town centers of varying size and transit accessibility.

Current Practices

As developers became more interested in mixed-use development and travel impact studies became more prevalent traffic study preparers and reviewers focused on internal trip capture.

Internal trips are those trips that do not impact the external street system. These trips are made using the internal roadways within a multi-use development. They can be made by either a vehicle or by walking. Pass-by trips, made by motorists already on the roadway adjacent to the development, impact the driveways of the development but not the external interception. These trips are made by "traffic passing the site" on the way from an origin to an ultimate destination. They may not add new traffic to the adjacent street system (Trip Generation Handbook, 2004). The internal trip capture is usually expressed as a percentage or rate but it can also be described as an equation. Internal trip rate estimates are primarily used to adjust the trip generation estimates in traffic impact studies. Internal trips reduce the magnitude of external trip generation by combining travels for different purposes due to the various land uses in one development (Barton Ashman Associates, Inc., 1993).

Procedures for determining internal capture rate vary significantly. In a 1993 survey of 15 Texas cities that required traffic impact studies, 11 allowed reductions for mixed-use developments (Barton Ashman Associates, Inc., 1993). The law in Destin, Florida, states that any applicant's internal capture rate must be justified with empirical data from an industry-recognized source that is for a similar land use in a similar urban environment. Additionally, any internal data capture rate exceeding 25 percent must be justified and approved by the city (Capital Improvement Inventories and Analysis, 2004). San Diego, California, stipulates internal capture reduction by land use type (i.e., residential, office, and retail) and time of day (e.g., AM peak, PM peak, daily) (Traffic Impact Study Manual, 1998).

A traffic impact study for the Heber City Town Center in Heber Utah attempted to project the site's trip generation and distribution for expected conditions in 2006, 2011 and 2030 in order to see what improvements were necessary (Horrocks Engineers, 2008).

The Town Center South Transportation Study also tried to estimate the development's potential traffic impact in Guildford, Connecticut (Cloug Harbour & Associated LLP, 2008). While the study resulted in recommendations, they probably will not be enacted until significant traffic growth materializes on the studied roadways

Bochner (2006) defines town centers as one or multiple blocks of ground floor retail (with residential and or office space on the upper floors) that face the street. This report considers town centers as part of a recent trend in modern mixed-use developments. A primary form of a mixed-use development is a mixed-use center, which is often developed on a single interconnected site and contains several uses that may or may not be fully interactive. This model of building became the norm for developers and was ingrained in local zoning and

building codes to protect suburban homeowners from some of the noxious uses found in cities. While the study concluded that trip generation rates and mode split for mixed-use developments are affected by traveler characteristics (e.g., income and vehicle availability), the project did not collect site-internal travel data that included those details because it was for a proposed development in the zoning stage (and that information is difficult to project).

In a comparison of the weekday trip generation rates for age-restricted and unrestricted (i.e., a typical single family development) housing, Racca (2006) concluded that senior housing generates two-thirds of the traffic made by unrestricted housing, showing that trips decrease with age.

METHODOLOGY

The nine developments selected for this study were chosen based on the ITE guidelines, as well as the SHA's current projects, development practices and staff recommendations. As suggested by the National Cooperative Highway Research Program's data collection framework, we contacted the owners and managers of the selected properties to discuss the nature of our project and the purpose of our data collection (NCHRP, 2007). We stressed that our work would not impede patrons or divulge proprietary or sensitive information. In some cases, we had to choose another property when we failed to receive permission from the management.

The selected age-restricted developments are in Baltimore, Owings Mills, Annapolis, Columbia and Frederick. The characteristics of the sites can be seen in Table 1. Due to confidentiality issues, the development names and specific characteristics are not presented. ARH2[1] was added because the results for ARH4 were biased and inconclusive. ARH4 was removed from this study because unsold units in the complex were attracting extra traffic from potential buyers, producing biased results. (As can be seen later in Table 3 and Figure 10.1, ARH4 had the highest trip rate of all the retirement communities.) The two properties in Frederick were treated as one aggregated development due to their proximity and shared parking lot.

Development Name	City	Total Units	Occupied Units	# of Parking	# of Employees
ARH1	Baltimore	100	97	180	4
ARH2	Owings Mills	72	69	140	0
ARH3	Annapolis	166	120	328	3
ARH4	Columbia	132	132	200	2
ARH5-1	Frederick	120	114	156	4
ARH5-2	Frederick	51	42	75	0

Table 1: Characteristics of the Selected Age-Restricted Developments in Maryland

[1] Age Restricted Housing #2

Table 2 details the selected town centers. All of the town centers have a gross leaseable area of at least 300,000 square feet.

Development Name	City	Gross Floor Area	Rentable Area	Total Acres	# of Parking
TC1*	Nottingham	1,200,000	1,152,000	250	6,800
TC2	Cockeysville	1,140,000	900,000	85	4,300
TC3	Owings Mills	1,200,000	1,080,000	280	5,300
TC4	Glen Burnie	1,070,000	1,070,000	75	5,100

Table 2: Characteristics of the Selected Town Centers in Maryland

*: Town Center #1

Data Collection

The owners of the aforementioned developments gave us permission to install counting devices at all entrances and exits so that we could count the number of cars entering and exiting the property for one week.

The counting device — JTF-HS-16M-4RT-S, Trax Flex High Speed Counter with lock and chain — tallies vehicles in both high and low speed situations. The device also calculates the speed, number of axels and length of each vehicle. The counting result of each situation was validated by manual counting.

We also obtained the street counts from SHA for the adjacent streets and performed counts on the adjacent streets which were not available by the SHA. The traffic was counted for a full seven-day period so we could determine the peak period of the generator and the adjacent streets.

Transit Survey

Knowing the trip purpose can also be useful in the estimation of internal trip capture (NCHRP, 2007). To this end, we surveyed bus riders at all four town centers. We explained the purpose of the survey and they were told that participation was not mandatory. A total of 275 bus riders participated.

In addition to demographic questions (e.g., age, race, and gender), survey participants were asked the time of day they usually take the bus to and from the mall and the frequency, duration, and purpose of their mall visits.

RESEARCH FINDINGS

Age-Restricted Housing

The morning and evening peak periods for the developments and their adjacent streets were averaged separately and identified based on the average of 15-minute counts. Table 3 presents the counting results for each housing development. The averaging was done separately because, as Table 4 shows, the peak periods of the senior housing and the adjacent streets differ due to the fact that many of the development's residents are retired and do not go to work every day.

Table 3: Total Trips Ends and Directional Distribution of Trips in Age-Restricted Developments

As presented in Table 3 and Figure 10-1, ARH4 has a very high number of trips compared to other developments. We investigated the problem and found that there are many unsold units in the ARH4-II. In order to visit ARH4-II which is not our study site, visitors had to enter and pass ARH4-I (our study site). Therefore, the results are biased and inconclusive. We removed the results of this site and included another development (Wyndham Commons) to be studied.

Table 4: Peak Periods of Trips in Age-Restricted Developments

Figures 10-17 show the relationship between the trip ends of each age-restricted development and the number of dwelling units by time of day.

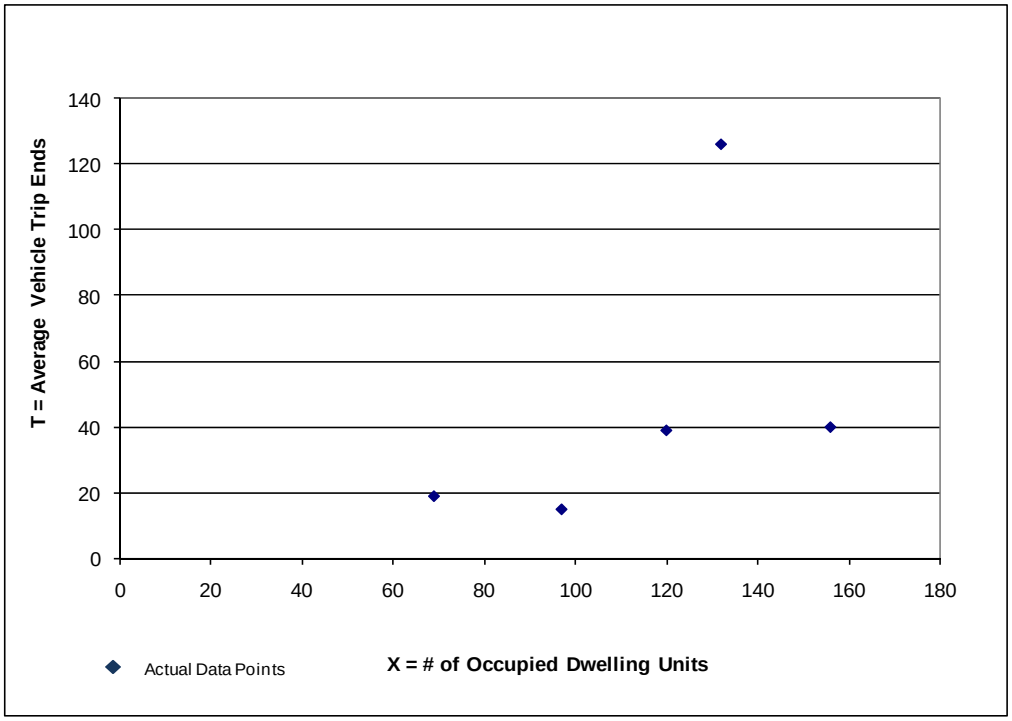


Figure 1.1: Average Vehicle Trip Ends versus Occupied Dwelling Units on a Weekday, AM Peak Period of the Adjacent Street (including ARH#4)

[redacted]

Figure 1.2: Average Vehicle Trip Ends versus Occupied Dwelling Units on a Weekday, AM Peak Period of the Adjacent Street

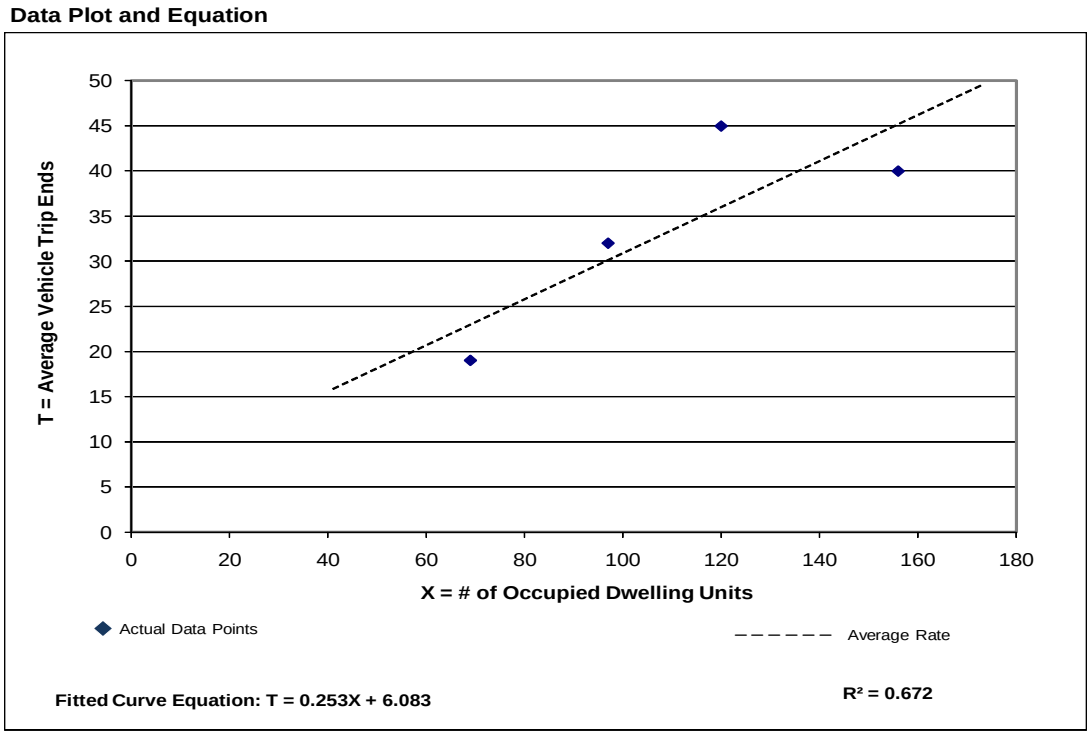


Figure 2: Average Vehicle Trip Ends versus Occupied Dwelling Units on a Weekday, AM Peak Period of the Development

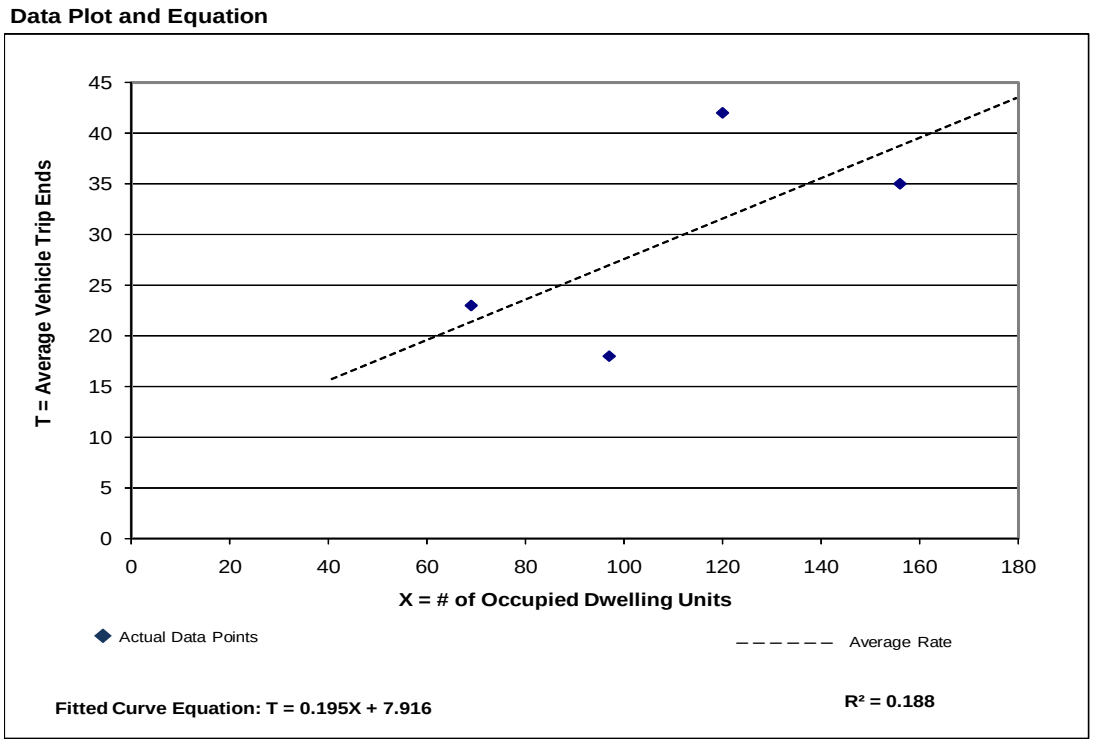


Figure 3: Average Vehicle Trip Ends versus Occupied Dwelling Units on a Weekday, PM Peak Period of the Adjacent Street

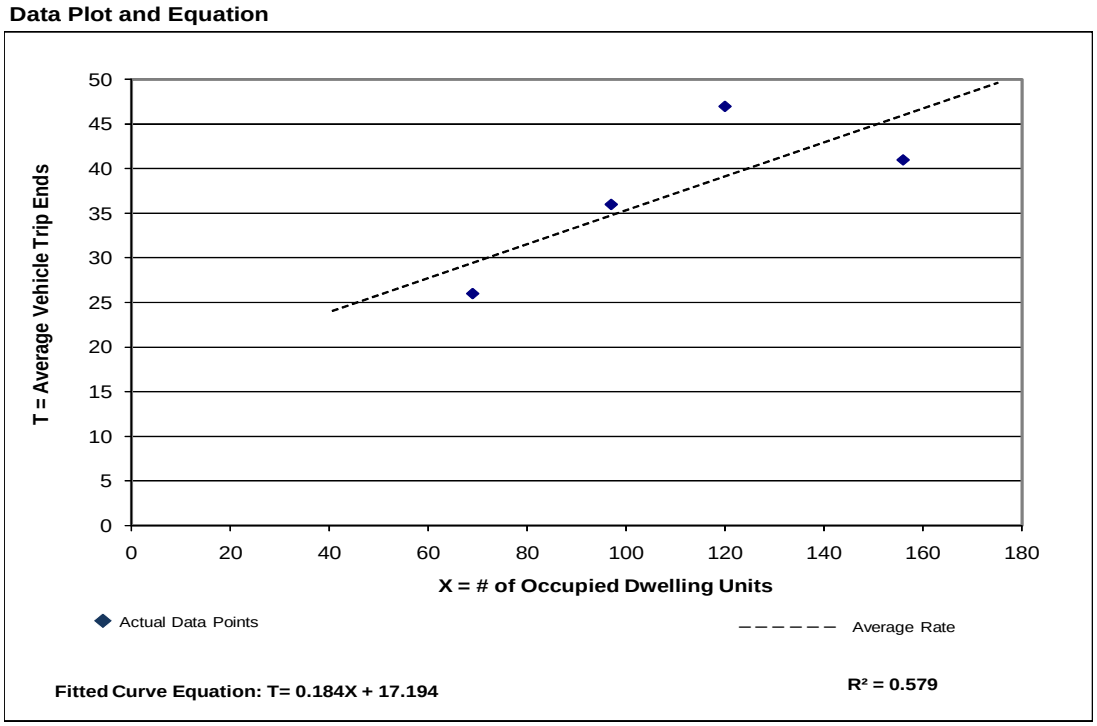


Figure 4: Average Vehicle Trip Ends versus Occupied Dwelling Units on a Weekday, PM Peak Period of the Development

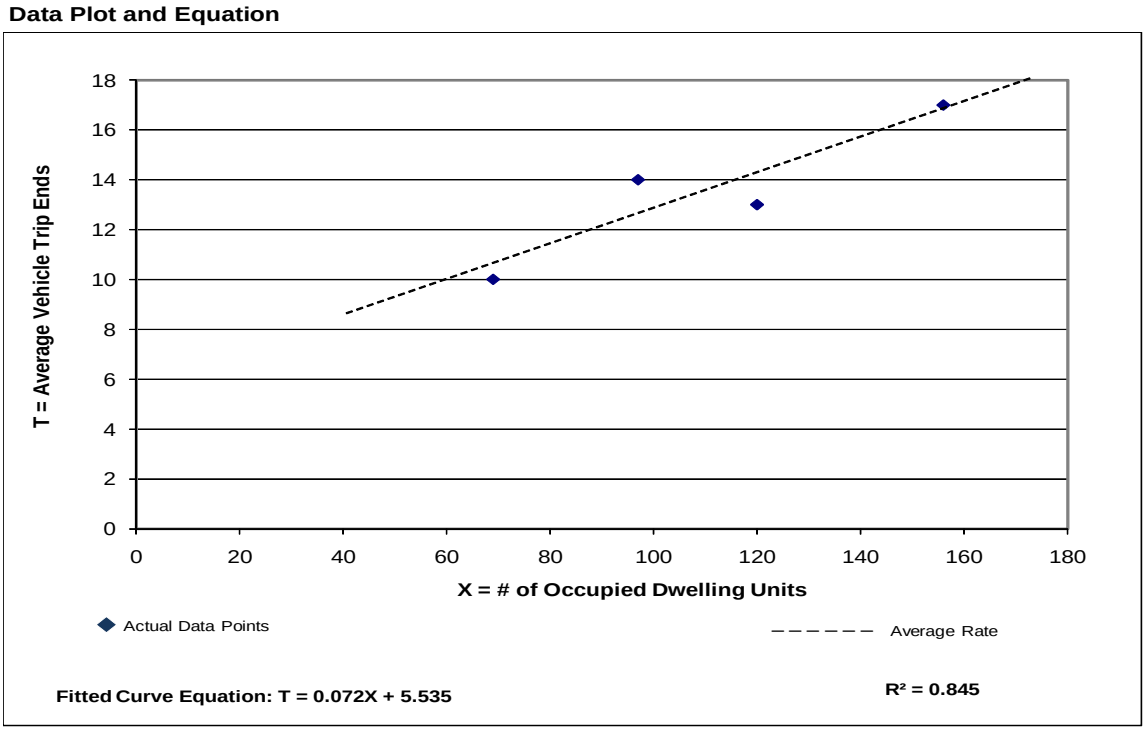


Figure 5: Average Vehicle Trip Ends versus Occupied Dwelling Units on a Saturday, All Day

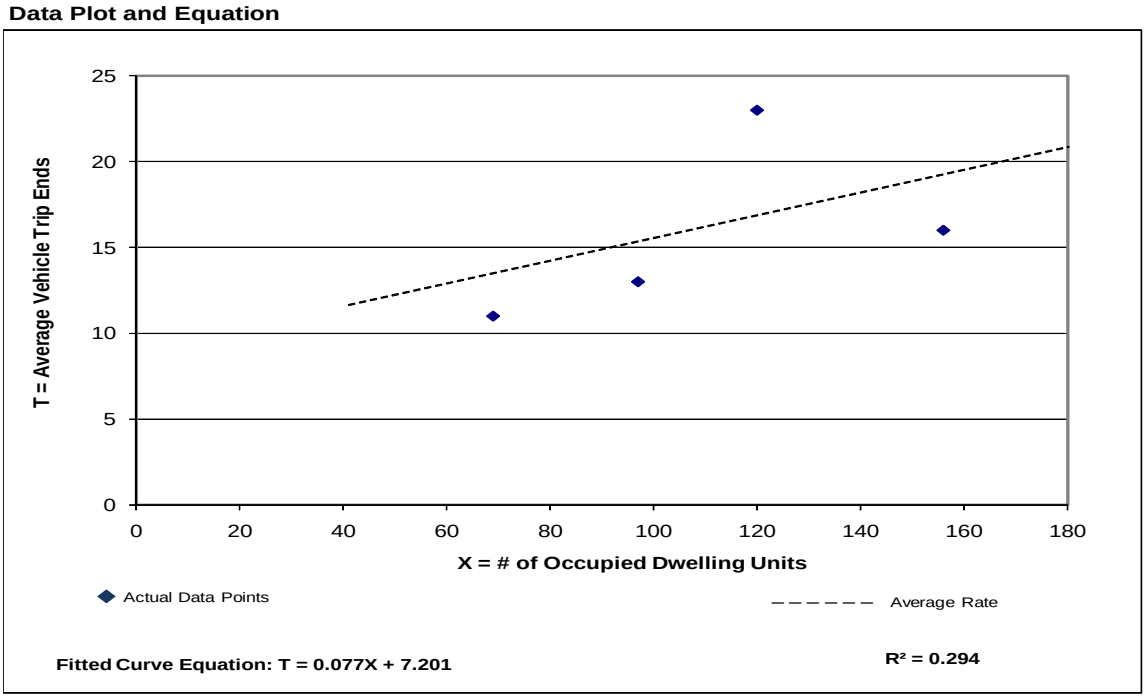


Figure 6: Average Vehicle Trip Ends versus Occupied Dwelling Units on a Sunday, All Day

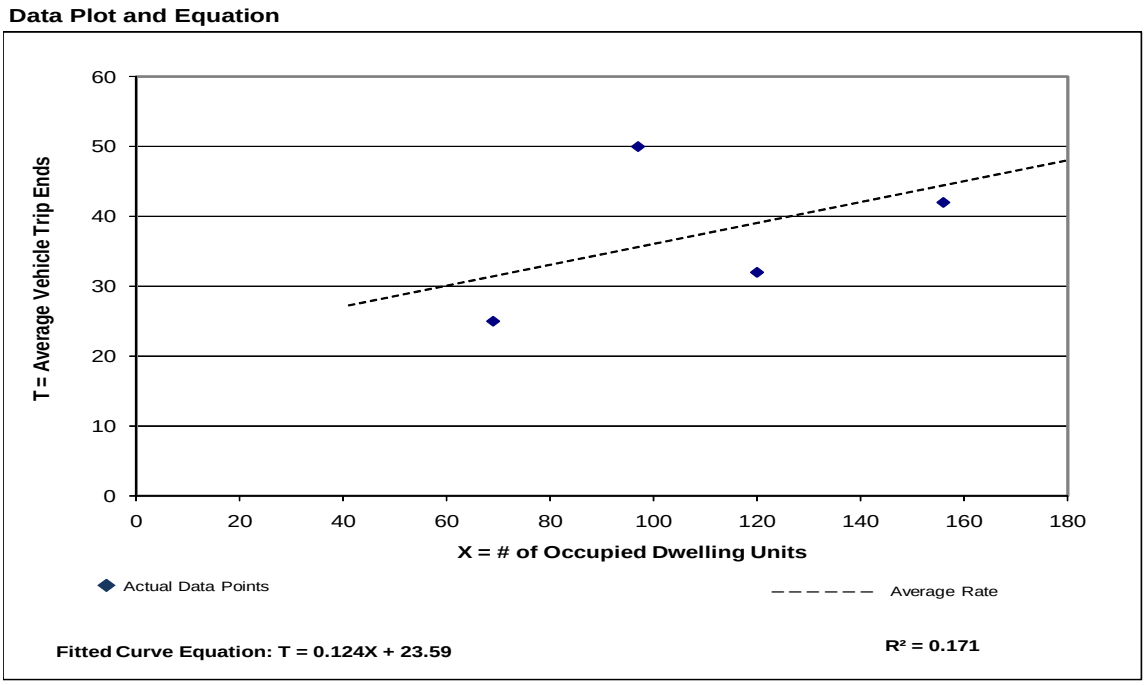


Figure 7: Average Vehicle Trip Ends versus Occupied Dwelling Units on a Saturday, Peak Period of Development

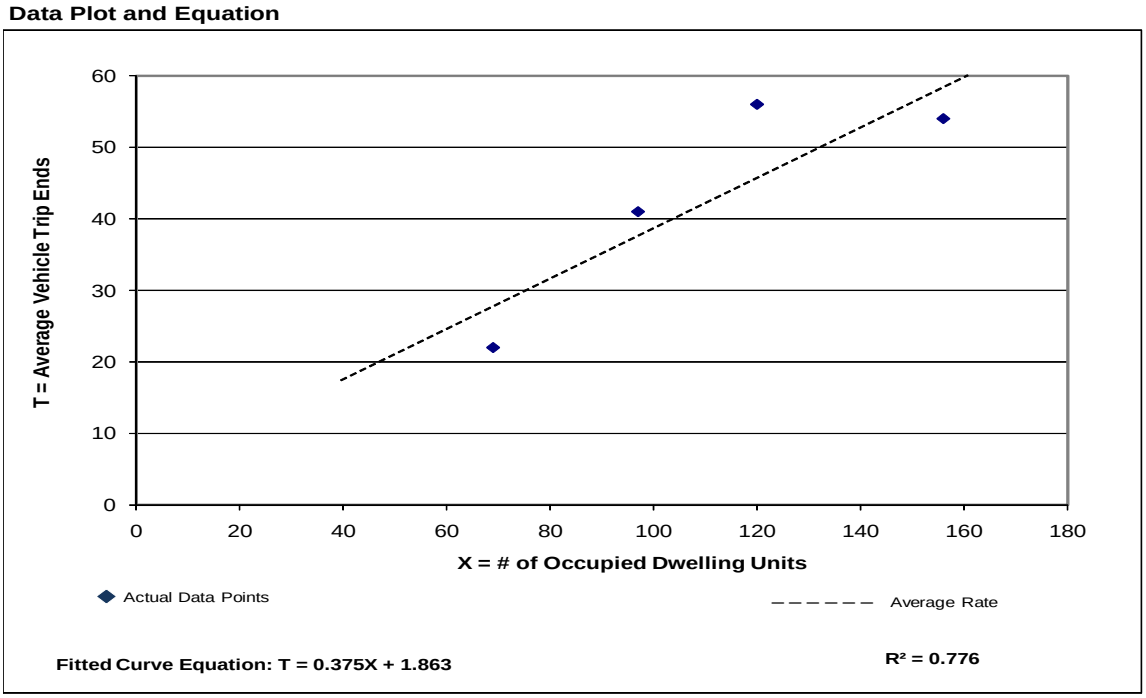


Figure 8: Average Vehicle Trip Ends versus Occupied Dwelling Units on a Sunday, Peak Period of Development

Figures 18-21 plot our observed trip rates and the ITE rates on the same graph. It is clear that the developments under study produce more trips than is reported in the ITE handbook for each time of day.

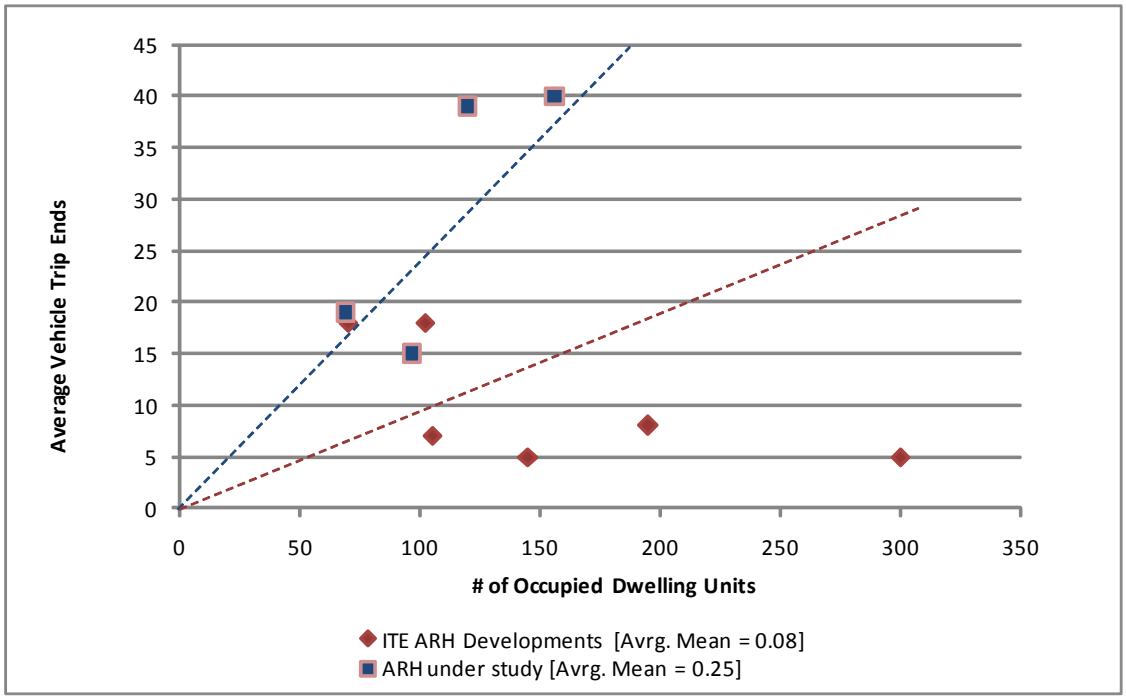


Figure 9: Average Vehicle Trip Ends versus Occupied Dwelling Units on a Weekday, AM Peak Period of the Adjacent Street- Combining the age-restricted housings under study with the ITE developments

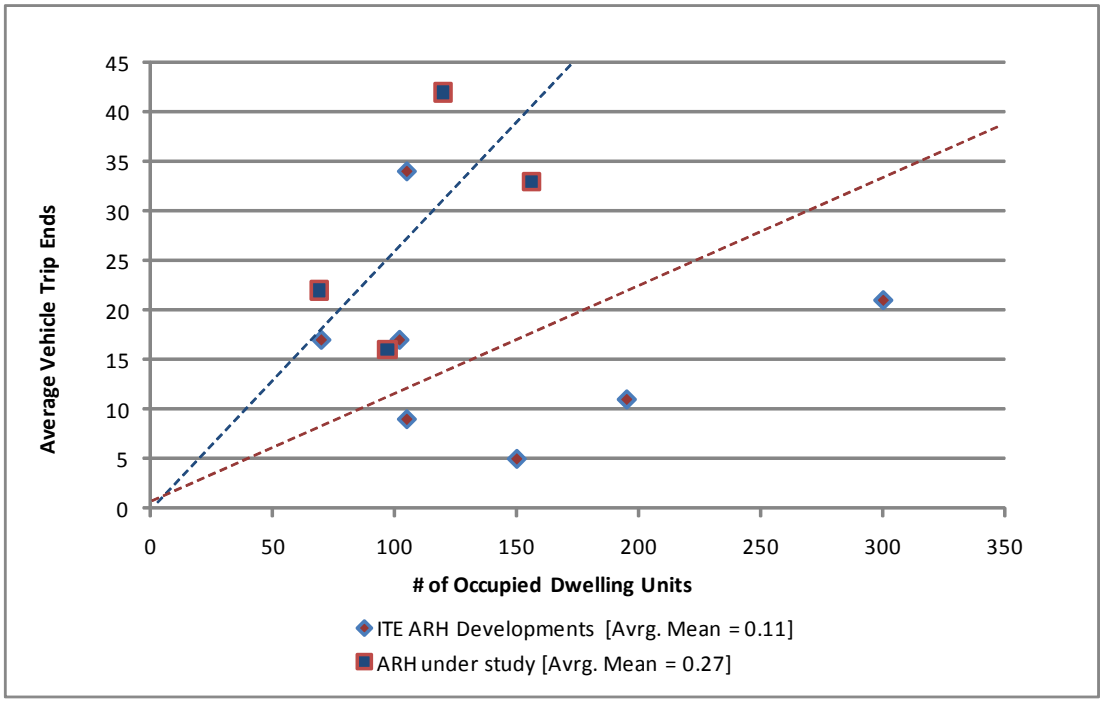


Figure 10: Average Vehicle Trip Ends versus Occupied Dwelling Units on a Weekday, AM Peak Period of the Development-Combining the Age-Restricted Housings under Study with the ITE Developments

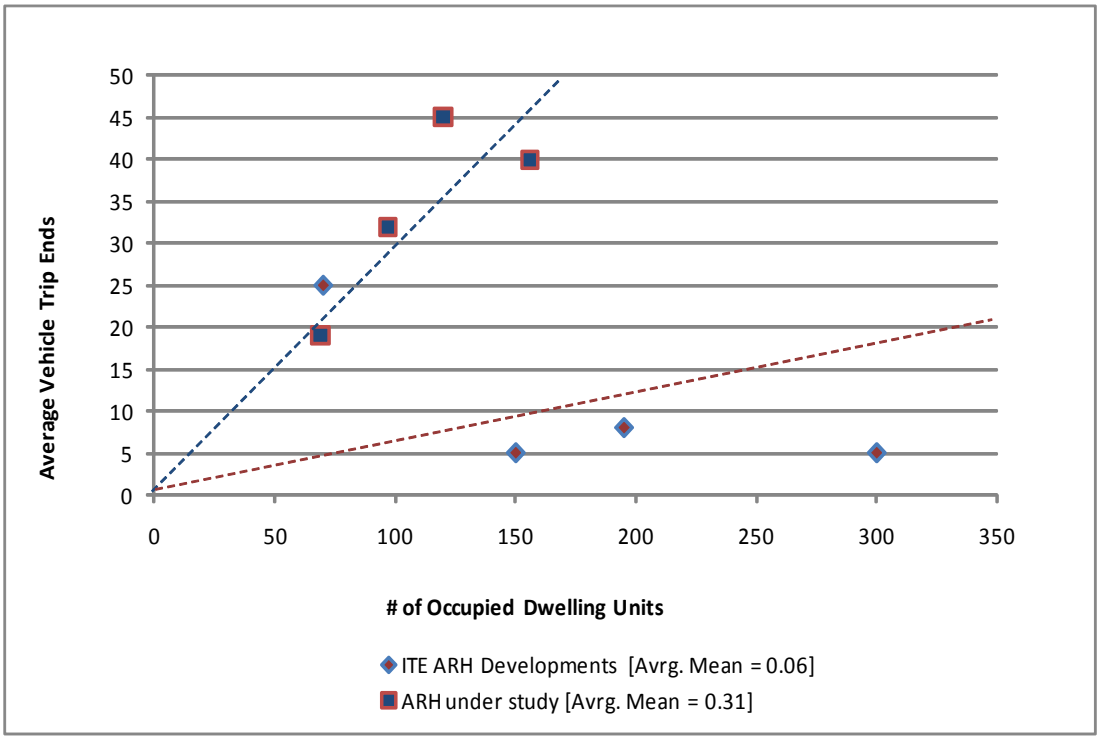


Figure 11: Average Vehicle Trip Ends versus Occupied Dwelling Units on a Weekday, PM Peak Period of the Adjacent Street-Combining the Age-Restricted Housings under Study with the ITE Developments

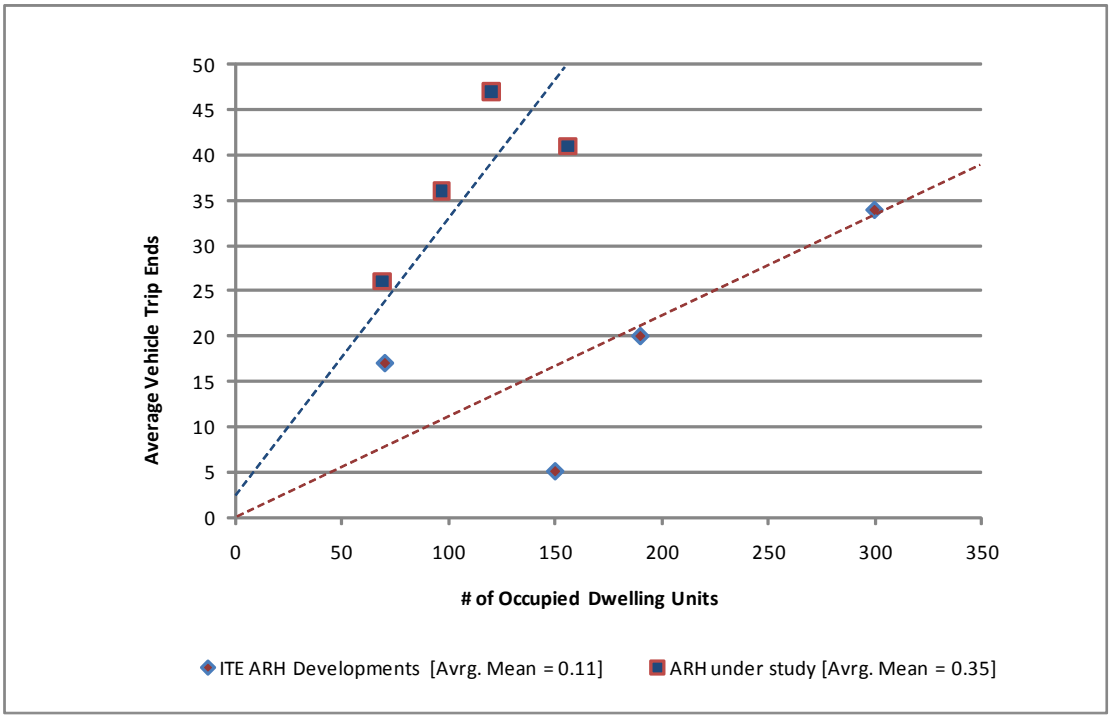


Figure 12: Average Vehicle Trip Ends versus Occupied Dwelling Units on a Weekday, PM Peak Period of the Development-Combining the Age-Restricted Housings under Study with the ITE Developments

Table 5a compares the ITE manual's estimated trip rates with our study's, and Table 5b compares our results with other studies in the literature. The ITE trip rates are around one-third of our trip rates, and our trip rates are similar to those produced by other studies.

	Average ARH Trip Rates			
	AM Peak Adj. St.	**PM Peak Adj. St.**	**AM Peak Generator**	**PM Peak Generator**
Studied Developments	0.25	0.27	0.31	0.35
ITE Rates for ARH	0.08	0.11	0.06	0.11

Table 5a: Trip Rates Comparison for Age-Restricted Housings on a Weekday

	Age-Restricted Housings - Summary of Trip Rates								
	Weekday	AM Peak - Adj. St.	AM Peak - Devlpmt.	PM Peak - Adj. St.	PM Peak - Devlpmt.	Saturday Peak	Saturday - All day	Sunday Peak	Sunday - All day
Maryland (Our ARHs)	3.83	0.25	0.31	0.27	0.35	0.35	0.13	0.39	0.15
New Jersey	2.58	0.15	-	0.22	-	-	-	-	-
City of Evansville, IN	3.94	0.26	0.35	0.30	0.39	-	-	-	-
New Hampshire	3.42	0.18	0.40	0.23	0.33	0.29	0.11	0.36	0.12

Table 5b: Trip Rates Comparison for Age-Restricted Housings with Other Studies

A *t*-test, which yielded a t-value of -8.224 and a P-value of 0.004, confirmed that there are statistically significant differences between our rates and the ITE's trip rates for age-restricted housing (Table 6).

Paired Samples Statistics

		Mean	N	Std. Deviation
Pair 1	MSU	.2925	4	.04787
	ITE	.0900	4	.02449

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	MSU & ITE	4	.199	.801

Paired Samples Test

		Paired Differences				t	df	Sig. (2-tailed)
		Mean	Std. Deviation	95% Confidence Interval of the Difference				
				Lower	Upper			
Pair 1	MSU - ITE	.20250	.04924	.12414	.28086	8.224	3	.004

Table 6: T-test - Comparison of Age-Restricted Housing Trip Rates from Our Study and ITE.

We also counted the number of passing cars on the streets surrounding each development, which is presented in Table 7.

Table 7: Trip Ends on the Adjacent Streets of the Age-Restricted Developments

To see how the trips differed, we compared our trip rates for age-restricted housing to the ITE manual's trip rates for regular, low-raise condominiums and townhouses. The results indicate that, on average, age-restricted housing residents make 27 to 63 percent less trips than regular housing residents (Tables 8 and 9).

	Average ARH Trip Rates			
Age-Restricted Housing	**AM Peak Adj. St.**	**PM Peak Adj. St.**	**AM Peak Generator**	**PM Peak Generator**
Studied Developments	0.25	0.27	0.31	0.35
Regular Housing	0.61	0.38	0.53	0.63

Table 8: Trip Rate Comparison between Age-Restricted and Regular Housing

	Development Name	Occupied Dwelling Units	ITE Trip Ends	Trip Ends Variation	Age-Restricted Housings
Weekday AM Peak of Adjacent St.	ARH1	97	36	-58%	15
	ARH3	120	56	-30%	39
	ARH2	69	11	72%	19
	ARH5	156	88	-54%	40
Weekday PM Peak of Adjacent St.	ARH1	97	NA	NA	18
	ARH3	120	NA	NA	42
	ARH2	69	NA	NA	23
	ARH5	156	NA	NA	35
Weekday AM Peak of Development	ARH1	97	57	-44%	32
	ARH3	120	69	-35%	45
	ARH2	69	42	-55%	19
	ARH5	156	88	-54%	40
Weekday PM Peak of Development	ARH1	97	55	-34%	36
	ARH3	120	66	-29%	47
	ARH2	69	40	-36%	26
	ARH5	156	83	-51%	41

Table 9: Trip Ends of Age-Restricted Housings versus ITE-Estimated Trip Ends for Regular Low-Raise Condominium/Town House

The ITE regression models reported for regular low-raise condominiums and town houses for each time period are as follows:

Equation 1: Trip Ends for Weekday AM Peak Period of Adjacent Streets

$$\ln(T) = 0.88x + 49.7$$

Equation 2: Trip Ends for Weekday AM Peak Period of Development

$$\ln(T) = 0.9\ln(x) + 0.07$$

Equation 3: Trip Ends for Weekday PM Peak Period of Development

$$\ln(T) = 0.89\ln(x) + 0.07$$

where T denotes average vehicle trip ends, and x denotes occupied dwelling units.

Town Center

As with senior housing, we counted the trip ends of the town centers and their adjacent streets for one week and calculated the peak periods for the weekday mornings and evenings, as well as Saturday and Sunday (Table 10). Table 11 presents the peak periods of the studied town centers and Table 12 shows the hourly variation in town center traffic. Detailed in Table 13 are the traffic counts for each development's surrounding streets that we obtained from the Traffic Monitoring System Report Module on the SHA's website.

		Town Centers - Summary of Trip Ends Averages (per hour)								Total Count	
		AM Peak - Adj. St.	AM Peak - Devlpmt.	PM Peak - Adj. St.	PM Peak - Devlpmt.	Saturday Peak	Saturday All day	Sunday Peak	Sunday - All day	Saturday	Sunday
TC2	Total	754	1,806	2,344	2,699	2,652	1,240	1,772	964	29,766	21,201
	Entering (%)	63%	63%	58%	59%	51%	52%	48%	53%	52%	52%
	Exiting (%)	37%	37%	42%	41%	49%	48%	52%	47%	48%	48%
TC4	Total	280	1,130	1,589	1,659	2,598	1,126	1,722	578	26,611	13,861
	Entering (%)	65%	55%	48%	48%	46%	43%	52%	46%	44%	46%
	Exiting (%)	35%	45%	52%	52%	54%	57%	48%	54%	56%	54%
TC3	Total	1,302	1,302	1,805	1,805	1,809	843	1,381	519	20,222	12,455
	Entering (%)	74%	74%	38%	38%	47%	50%	48%	50%	50%	50%
	Exiting (%)	26%	26%	62%	62%	53%	50%	52%	50%	50%	50%
TC1	Total	976	2,565	3,616	3,616	4,211	2,004	3,698	1,415	48,089	32,483
	Entering (%)	61%	58%	46%	46%	49%	49%	48%	49%	49%	50%
	Exiting (%)	39%	42%	54%	54%	51%	51%	52%	51%	51%	50%

Table 10: Total Trips and Directional Distribution of Trips in Town Centers

	Town Centers - Peak Periods					
	AM Peak - Adjacent St.	AM Peak - Devlpmt.	PM Peak - Adjacent St.	PM Peak - Devlpmt.	Saturday Peak	Sunday Peak
TC2	7:00 - 9:00	11:00 - 12:00	16:00 - 18:00	12:00 - 13:00	15:00 - 16:00	15:00 - 16:00
TC4	7:00 - 9:00	11:00 - 12:00	16:00 - 18:00	18:00 - 19:00	14:00 - 15:00	13:00 - 14:00
TC3	7:00 - 9:00	8:00 - 9:00	16:00 - 18:00	17:00 - 18:00	15:00 - 16:00	16:00 - 17:00
TC1	7:00 - 9:00	11:00 - 12:00	16:00 - 18:00	17:00 - 18:00	14:00 - 15:00	15:00 - 16:00

Table 11: Peak Periods of Trips in Town Centers

Table 2 Hourly Variation in Shopping Center Traffic More Than 300,000 Square Feet Gross Leasable Area						
Time	**Average Weekday**		**Average Saturday**		**Average Sunday**	
	Percent of 24 Hour Entering Traffic	**Percent of 24 Hour Exiting Traffic**	**Percent of 24 Hour Entering Traffic**	**Percent of 24 Hour Exiting Traffic**	**Percent of 24 Hour Entering Traffic**	**Percent of 24 Hour Exiting Traffic**
10 - 11 a. m.	6%	3%	7%	3%	6%	3%
11 a. m. - 12 p. m.	7%	5%	8%	5%	10%	5%
12 - 1 p. m.	9%	8%	9%	7%	12%	8%
1 - 2 p. m.	8%	8%	9%	8%	12%	10%
2 - 3 p. m.	7%	8%	9%	9%	11%	11%
3 - 4 p. m.	7%	8%	8%	9%	10%	11%
4 - 5 p. m.	7%	8%	8%	8%	9%	11%
5 - 6 p. m.	9%	9%	8%	8%	7%	10%
6 - 7 p. m.	9%	9%	8%	9%	6%	10%
7 - 8 p. m.	7%	8%	7%	8%	4%	7%
8 - 9 p. m.	5%	7%	5%	7%	2%	3%
9 - 10 p. m.	3%	7%	3%	7%	2%	2%

Total Entering trips (Weekdays)	233,736
Total Exiting trips (Weekdays)	245,425
Total Entering trips (Saturdays)	60,861
Total Exiting trips (Saturdays)	63,826
Total Entering trips (Sundays)	39,853
Total Exiting trips (Sundays)	40,148

Table 12: Hourly Variation in Town Center Traffic

Table 13: Traffic Volumes on the Adjacent Streets around Town Centers

There is no trip estimation for town centers in the ITE handbook. Therefore, we classified the developments (or tenants) in each town center according to the development types listed in the

ITE manual, added the trip rates (ends) and compared them to our results. The results of the comparison can be seen in Tables 14-16.

				Trip Ends Comparison								
Tenant	**Type**	**Sq. Ft.**	**Total Area**	**Weekday**	**AM PK Ad St**	**PM PK Ad St**	**AM PK Gen**	**PM PK Gen**	**Saturday**	**Sat Pk**	**Sunday**	**Sun Pk**
Developer Retail Buildings	Shopping Center	778,271 28,379	806.7	26,380	548	2,483	548	2,483	34,424	3,362	16,822	2,383
Ikea	Furniture Store	201,300	201.3	1,032	34	93	81	107	996	161	946	181
Bank of America	Drive-in Bank	2,000	2.0	622	25	92	82	105	111	80	45	8
Burger King Wendys	Fast-Food Restaurant with Drive Through Window	2,500 2,500	5.0	2,500	275	183	288	225	3,700	300	2,740	294
7 Eleven	Gasoline/ Service Station with Convenience Market	8,500	8.5	9,252	633	833	633	833	9,252	385	9,252	385
Olive Garden	Quality Restaurant	7,200	7.2	648	6	54	40	65	641	78	524	58
Jared P F Chan	Shopping Center	6,000 7,500	13.5	1,848	47	167	47	167	2,617	236	4,425	138
Giant Food	Supermarket	53,687	53.7	4,986	211	571	581	576	9,539	612	8,950	975
	Total ITE Suggested Trip Ends	-	1,098	47,267	1,779	4,476	2,300	4,562	61,280	5,215	43,704	4,423
	Dvlpmt. Under Study Trip Ends	-	1,200	40,896	976	3,616	2,565	3,616	48,096	4,211	33,960	3,698
	ITE Suggested Trip Rates	-	-	43.05	1.62	4.08	2.09	4.16	55.82	4.75	39.81	4.03
	Dvlpmt. Under Study Trip Rates	-	-	34.08	0.81	3.01	2.14	3.01	40.08	3.51	28.30	3.08
	Diff. %	-	-	-26.33%	-99.20%	-35.30%	2.00%	-37.89%	-39.27%	-35.36%	-40.67%	-30.74%

Table 14a: Trip Ends Calculations from ITE for Each Development Type and Trip Rate Comparisons with Our Results at TC1

				Trip Ends Comparison								
Tenant	**Type**	**Sq. Ft.**	**Total Area**	**Weekday**	**AM PK Ad St**	**PM PK Ad St**	**AM PK Gen**	**PM PK Gen**	**Saturday**	**Sat Pk**	**Sunday**	**Sun Pk**
Developer Retail Buildings	Shopping Center	546,915	546.92	20,492	434	1,921	434	1,921	26,949	2,612	12,763	1,648
Regal Cinemas	Multiplex Movie Theater	45,600	45.60	4,508	N/A	194	N/A	805	3,892	695	3,500	625
M & T Bank Sun Trust Bank	Drive-in Bank	3,200 2,500	5.70	1,296	70	260	164	300	431	210	120	23
Carrabba's Italian Grill Damon's Sports Theatre and Grille Greystone Grill Outback Steakhouse	Quality Restaurant	6,200 11,905 6,130 6,800	31.04	2,794	25	233	171	279	2,929	337	2,193	230
Wegmans	Supermarket	140,000	140.00	10,765	1,076	1,217	1,692	1,229	24,858	1,245	23,333	2,485
	Total ITE Suggested Trip Ends	769,250	769	40,112	1,605	3,825	2,461	4,534	59,059	5,099	41,909	5,012
	Dvlpmt. Under Study Trip Ends	-	1,016	27,288	754	2,344	1,806	2,699	29,760	2,652	23,136	1,772
	ITE Suggested Trip Rates	-	-	52.14	2.09	4.97	3.20	5.89	76.77	6.63	54.48	6.52
	Dvlpmt. Under Study Trip Rates	-	-	26.86	0.74	2.31	1.78	2.66	29.29	2.61	22.77	1.74
	Diff. %	-	-	-94.14%	-181.07%	-115.52%	-79.97%	-121.88%	-162.11%	-153.92%	-139.24%	-273.55%

Table 14b: Trip Ends Calculations from ITE for Each Development Type and Trip Rate Comparisons with Our Results at TC2

				Trip Ends Comparison								
Tenant	Type	Sq. Ft.	Total Area	Weekday	AM PK Ad St	PM PK Ad St	AM PK Gen	PM PK Gen	Saturday	Sat Pk	Sunday	Sun Pk
Developer Retail Buildings	Shopping Center	645,000	645.00	22,811	479	2,142	479	2,142	29,900	2,907	14,296	1,925
AMC	Multiplex Movie Theater	68,800	68.80	6,894	N/A	338	N/A	1,231	6,373	1,138	5,740	1,025
Don Pablo's Mexican Kitchen	Quality Restaurant	5,400	17.00	1,530	14	128	94	153	1,566	184	1,210	131
Red Lobster		3,200										
Red Robin		2,800										
Tony Roma's		5,600										
OM Corporate Offices	General Office Building	50,000	50.00	782	108	135	108	135	125	21	39	9
	Total ITE Suggested Trip Ends	781,800	781	32,017	601	2,743	681	3,661	37,965	4,251	21,285	3,089
	Dvlpmt. Under Study Trip Ends	-	1,040	18,960	1,302	1,805	1,302	1,805	20,232	1,809	12,456	1,381
	ITE Suggested Trip Rates	-	-	41.01	0.77	3.51	0.87	4.69	48.62	5.44	27.26	3.96
	Dvlpmt. Under Study Trip Rates		-	18.23	1.25	1.74	1.25	1.74	19.45	1.74	11.98	1.33
	Diff. %	-	-	-124.93%	38.55%	-102.41%	30.37%	-170.14%	-149.94%	-213.02%	-127.61%	-197.93%

Table 14c: Trip Ends Calculations from ITE for Each Development Type and Trip Rate Comparisons with Our Results at TC3

				Trip Ends Comparison								
Tenant	Type	Sq. Ft.	Total Area	Weekday	AM PK Ad St	PM PK Ad St	AM PK Gen	PM PK Gen	Saturday	Sat Pk	Sunday	Sun Pk
Developer Retail Buildings	Shopping Center	894,000	894.00	28,204	583	2,658	583	2,658	36,728	3,595	18,188	2,879
	Total ITE Suggested Trip Ends	894,000	894	28,204	583	2,658	583	2,658	36,728	3,595	18,188	2,879
	Dvlpmt. Under Study Trip Ends	-	894	16,704	280	1,589	1,130	1,659	27,024	2,598	13,872	1,722
	ITE Suggested Trip Rates	-	-	31.55	0.65	2.97	0.65	2.97	41.08	4.02	20.34	3.22
	Dvlpmt. Under Study Trip Rates	-	-	18.68	0.31	1.78	1.26	1.86	30.23	2.91	15.52	1.93
	Diff. %	-	-	-68.84%	-108.06%	-67.25%	48.45%	-60.19%	-35.91%	-38.36%	-31.11%	-67.19%

Table 14d: Trip Ends Calculations from ITE for Each Development Type and Trip Rate Comparisons with Our Results at TC4

	Trip Rates Summary								
	Weekday	AM PK Ad St	PM PK Ad St	AM PK Gen	PM PK Gen	Saturday	Sat Pk	Sunday	Sun Pk
ITE (Summary of Dvlpmts)	43.05	1.62	4.08	2.09	4.16	55.82	4.75	39.81	4.03
TC1	34.08	0.81	3.01	2.14	3.01	40.08	3.51	28.30	3.08
Difference (%)	-26.3%	-99.2%	-35.3%	2.0%	-37.9%	-39.3%	-35.4%	-40.7%	-30.7%
ITE (Summary of Dvlpmts)	52.14	2.09	4.97	3.20	5.89	76.77	6.63	54.48	6.52
TC2	26.86	0.74	2.31	1.78	2.66	29.29	2.61	22.77	1.74
Difference (%)	-94.1%	-181.1%	-115.5%	-80.0%	-121.9%	-162.1%	-153.9%	-139.2%	-273.5%
ITE (Summary of Dvlpmts)	41.01	0.77	3.51	0.87	4.69	48.62	5.44	27.26	3.96
TC3	18.23	1.25	1.74	1.25	1.74	19.45	1.74	11.98	1.33
Difference (%)	-124.9%	38.6%	-102.4%	30.4%	-170.1%	-149.9%	-213.0%	-127.6%	-197.9%
ITE (Summary of Dvlpmts)	31.55	0.65	2.97	0.65	2.97	41.08	4.02	20.34	3.22
TC4	18.68	0.31	1.78	1.26	1.86	30.23	2.91	15.52	1.93
Difference (%)	-68.8%	-108.1%	-67.2%	48.4%	-60.2%	-35.9%	-38.4%	-31.1%	-67.2%

Table 15: Trip Rates Comparisons between ITE and Our Results

	Trip Ends Summary								
	Weekday	AM PK Ad St	PM PK Ad St	AM PK Gen	PM PK Gen	Saturday	Sat Pk	Sunday	Sun Pk
ITE (Summary of Dvlpmts)	47,267	1,779	4,476	2,300	4,562	61,280	5,215	43,704	4,423
TC1	40,896	976	3,616	2,565	3,616	48,096	4,211	33,960	3,698
Difference (%)	-15.6%	-82.2%	-23.8%	10.3%	-26.1%	-27.4%	-23.8%	-28.7%	-19.6%
ITE (Summary of Dvlpmts)	40,112	1,605	3,825	2,461	4,534	59,059	5,099	41,909	5,012
TC2	27,288	754	2,344	1,806	2,699	29,760	2,652	23,136	1,772
Difference (%)	-47.0%	-112.8%	-63.2%	-36.3%	-68.0%	-98.5%	-92.3%	-81.1%	-182.8%
ITE (Summary of Dvlpmts)	32,017	601	2,743	681	3,661	37,965	4,251	21,285	3,089
TC3I	18,960	1,302	1,805	1,302	1,805	20,232	1,809	12,456	1,381
Difference (%)	-68.9%	53.9%	-52.0%	47.7%	-102.8%	-87.6%	-135.0%	-70.9%	-123.7%
ITE (Summary of Dvlpmts)	28,204	583	2,658	583	2,658	36,728	3,595	18,188	2,879
TC4I	16,704	280	1,589	1,130	1,659	27,024	2,598	13,872	1,722
Difference (%)	-68.8%	-108.1%	-67.2%	48.4%	-60.2%	-35.9%	-38.4%	-31.1%	-67.2%

Table 16: Trip Ends Comparisons between ITE and Our Results

CONCLUSIONS

The results verify the findings of a study presented in ITE Journal (Flynn and Boenau, 2007), therefore they verify that ITE manual underestimates trips generated by age-restricted housing. The ITE trip rates are 1/3 of what we calculated. However, the age-restricted housings under study make between 27 to 63 percent fewer trips than the regular housing. The results have been sent to the ITE to be incorporated in their manual.

The results also indicate that town centers warrant their own listing in the manual. Not only is it one of the fastest-growing development types in the United States but our comparison of the studied town center trip rates and the ITE rates for shopping centers denotes that town centers generate different trip rates.

Our survey of transit riders to the four town centers found that most are African Americans with an annual income of less than $30,000. The riders are mostly 16-34 years old and have no available vehicle in their household.

We hope that the SHA will use these results for traffic impact study and planning purposes. We also sent the results to the ITE so they can incorporate the more realistic trip rate estimates into their study.

APPENDIX 1

TRIP RATE COMPARISONS

	AM Peak Adj. St. ARH Veh. Trip Rate	Average ITE Rate			Regression ITE Rate		
		ITE Rate	ARH Rate as % of ITE Rate	% point difference from ITE Rate	ITE Rate	ARH Rate as % of ITE Rate	% point difference from ITE Rate
Age-Restricted Housings							
ARH1	0.15	0.37	42%	-58%	-	-	-
ARH3	0.27	0.47	57%	-43%	-	-	-
ARH2	0.28	0.16	172%	72%	-	-	-
ARH5	0.26	0.56	46%	-54%	-	-	-
Mean	0.24	-	79%	-21%			
Std. Dev.	0.05	-	54%	54%			

Note: Fitted Curve Equation for Apartments: ln(T) = 0.88ln(x) + 49.7, where T = average vehicle trip ends and x = 1000 square feet gross leasable area.

Table A1-1: AM Peak Period of Adjacent Street Trip Rates for Age-Restricted Housings

	AM Peak Dvlpmt. ARH Veh. Trip Rate	Average ITE Rate			Regression ITE Rate		
		ITE Rate	ARH Rate as % of ITE Rate	% point difference from ITE Rate	ITE Rate	ARH Rate as % of ITE Rate	% point difference from ITE Rate
Age-Restricted Housings							
ARH1	0.33	0.59	56%	-44%	-	-	-
ARH3	0.38	0.58	65%	-35%	-	-	-
ARH2	0.28	0.61	45%	-55%	-	-	-
ARH5	0.26	0.56	46%	-54%	-	-	-
Mean	0.31	-	53%	-47%			
Std. Dev.	0.05	-	8%	8%			

Note: Fitted Curve Equation for Apartments: ln(T) = 0.9ln(x) + 0.07, where T = average vehicle trip ends and x = 1000 square feet gross leasable area.

Table A1-2: AM Peak Period of Development Trip Rates for Age-Restricted Housings

	PM Peak Dvlpmt. ARH Veh. Trip Rate	Average ITE Rate			Regression ITE Rate		
		ITE Rate	ARH Rate as % of ITE Rate	% point difference from ITE Rate	ITE Rate	ARH Rate as % of ITE Rate	% point difference from ITE Rate
Age-Restricted Housings							
ARH1	0.37	0.56	66%	-34%	-	-	-
ARH3	0.39	0.55	71%	-29%	-	-	-
ARH2	0.38	0.59	64%	-36%	-	-	-
ARH5	0.26	0.54	49%	-51%	-	-	-
Mean	0.35	-	63%	-37%			
Std. Dev.	0.05	-	8%	8%			

Note: Fitted Curve Equation for Apartments: ln(T) = 0.89ln(x) + 0.07, where T = average vehicle trip ends and x = 1000 square feet gross leasable area.

Table A1-3: PM Peak Period of Development Trip Rates for Age-Restricted Housings

	Weekday TC Veh. Trip Rate	Average ITE Rate			Regression ITE Rate		
		ITE Rate	TC Rate as % of ITE Rate	% point difference from ITE Rate	ITE Rate	TC Rate as % of ITE Rate	% point difference from ITE Rate
Town Centers							
TC2	30.32	-	-	-	31.47	96%	-4%
TC4	15.61	-	-	-	29.62	53%	-47%
TC3	17.55	-	-	-	29.53	59%	-41%
TC1	35.50	-	-	-	28.87	123%	23%
Mean	24.74				-	83%	-17%
Std. Dev.	8.40				-	29%	29%

Note: Fitted Curve Equation for Apartments: ln(T) = 0.65ln(x) + 5.83, where T = average vehicle trip ends and x = 1000 square feet gross leasable area.

Table A1-4: Average Weekday Daily Trip Rates for Town Centers

	AM Peak Adj. St. TC Veh. Trip Rate	Average ITE Rate			Regression ITE Rate		
		ITE Rate	TC Rate as % of ITE Rate	% point difference from ITE Rate	ITE Rate	TC Rate as % of ITE Rate	% point difference from ITE Rate
Town Centers							
TC2	2.01	-	-	-	0.65	309%	209%
TC4	0.92	-	-	-	0.61	152%	52%
TC3	1.21	-	-	-	0.60	200%	100%
TC1	2.23	-	-	-	0.59	378%	278%
Mean	1.59				-	260%	160%
Std. Dev.	0.54				-	89%	89%

Note: Fitted Curve Equation for Apartments: ln(T) = 0.6ln(x) + 2.29, where T = average vehicle trip ends and x = 1000 square feet gross leasable area.

Table A1-5: AM Peak Period of Adjacent Street Trip Rates for Town Centers

	PM Peak Adj. St. TC Veh. Trip Rate	Average ITE Rate			Regression ITE Rate		
		ITE Rate	TC Rate as % of ITE Rate	% point difference from ITE Rate	ITE Rate	TC Rate as % of ITE Rate	% point difference from ITE Rate
Town Centers							
TC2	3.00	-	-	-	2.97	101%	1%
TC4	1.55	-	-	-	2.80	55%	-45%
TC3	1.67	-	-	-	2.79	60%	-40%
TC1	3.14	-	-	-	2.73	115%	15%
Mean	2.34				-	83%	-17%
Std. Dev.	0.73				-	26%	26%

Note: Fitted Curve Equation for Apartments: ln(T) = 0.66ln(x) + 3.4, where T = average vehicle trip ends and x = 1000 square feet gross leasable area.

Table A1-6: PM Peak Period of Adjacent Street Trip Rates for Town Centers

	Saturday TC Veh. Trip Rate	Average ITE Rate			Regression ITE Rate		
		ITE Rate	TC Rate as % of ITE Rate	% point difference from ITE Rate	ITE Rate	TC Rate as % of ITE Rate	% point difference from ITE Rate
Town Centers							
TC2	33.07	-	-	-	40.98	81%	-19%
TC4	24.87	-	-	-	38.44	65%	-35%
TC4	18.72	-	-	-	38.31	49%	-51%
TC1	41.74	-	-	-	37.40	112%	12%
Mean	29.60				-	76%	-24%
Std. Dev.	8.66				-	23%	23%

Note: Fitted Curve Equation for Apartments: ln(T) = 0.63ln(x) + 6.23, where T = average vehicle trip ends and x = 1000 square feet gross leasable area.

Table A1-7: Saturday Trip Rates for Town Centers

	Sunday TC Veh. Trip Rate	Average ITE Rate			Regression ITE Rate		
		ITE Rate	TC Rate as % of ITE Rate	% point difference from ITE Rate	ITE Rate	TC Rate as % of ITE Rate	% point difference from ITE Rate
Town Centers							
TC2	23.56	-	-	-	20.31	116%	16%
TC4	12.95	-	-	-	19.57	66%	-34%
TC3	11.53	-	-	-	19.53	59%	-41%
TC1	28.20	-	-	-	19.29	146%	46%
Mean	19.06				-	97%	-3%
Std. Dev.	7.03				-	36%	36%

Note: Fitted Curve Equation for Apartments: T = 15.63x + 4214.46, where T = average vehicle trip ends and x = 1000 square feet gross leasable area.

Table A1-8: Sunday Trip Rates for Town Centers

	Average ARH Trip Rates			
Age-Restricted Housings	**AM Peak Adj. St.**	**PM Peak Adj. St.**	**AM Peak Generator**	**PM Peak Generator**
Studied Developments	0.24	0.27	0.31	0.35
ITE Manual	0.08	0.11	0.06	0.11

Table A1-9: Trip Rate Comparison for Age-Restricted Housings

	Average TC Trip Rates						
Shopping Centers	**Weekday**	**AM Peak Adj. St.**	**PM Peak Adj. St.**	**Saturday**	**Saturday Peak**	**Sunday**	**Sunday Peak**
Studied Developments	24.74	1.59	2.34	29.60	2.68	19.06	2.02
ITE Manual	42.94	1.03	3.75	49.97	4.97	25.24	3.12

Table A1-10: Trip Rate Comparison for Shopping Centers

APPENDIX 2

TRANSIT SURVEY RESULTS

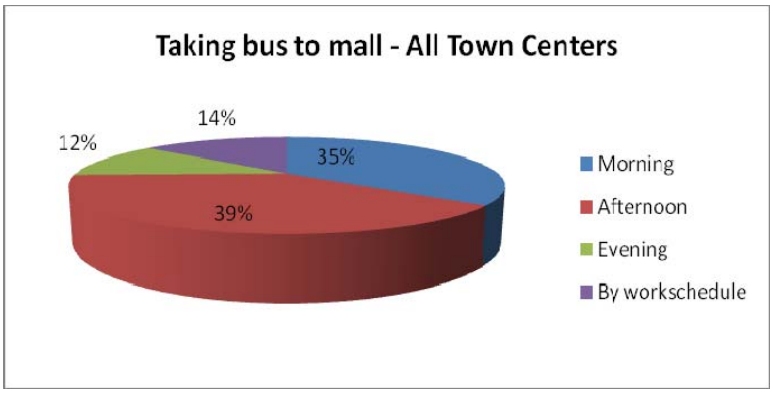


Figure A2-1: Time of Bus Ridership to Town Centers

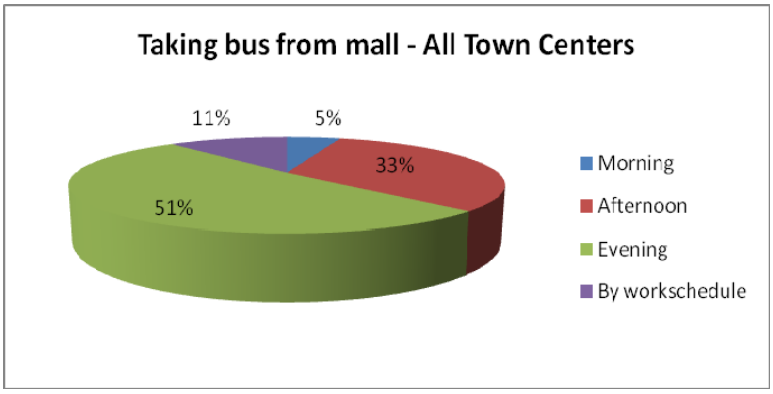


Figure A2-2: Time of Bus Ridership from Town Centers

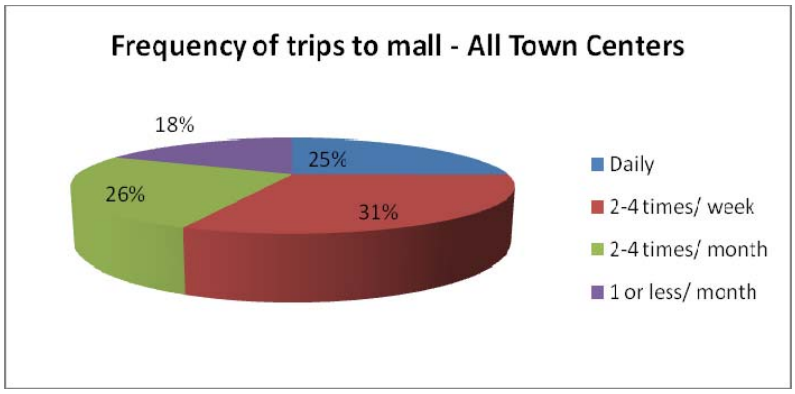


Figure A2-3: Frequency of Trips to Town Centers

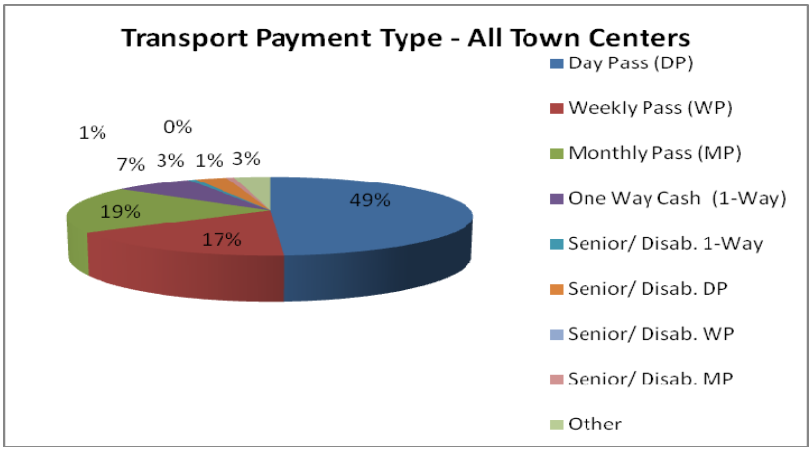


Figure A2-4: Type of Transport Payment to Town Centers

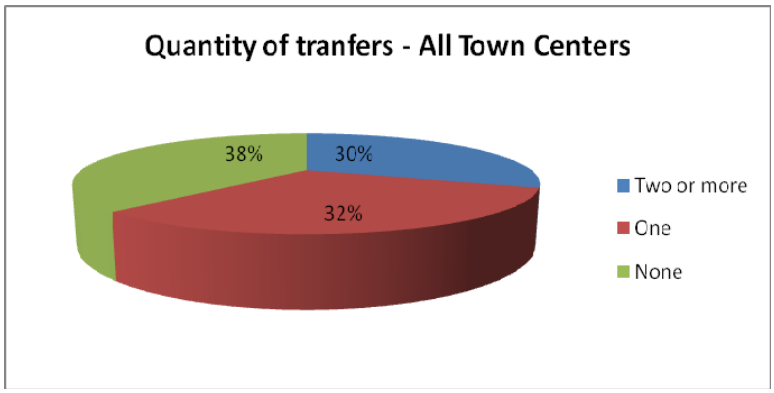


Figure A2-5: Number of Bus Transfers During Trip to Town Centers

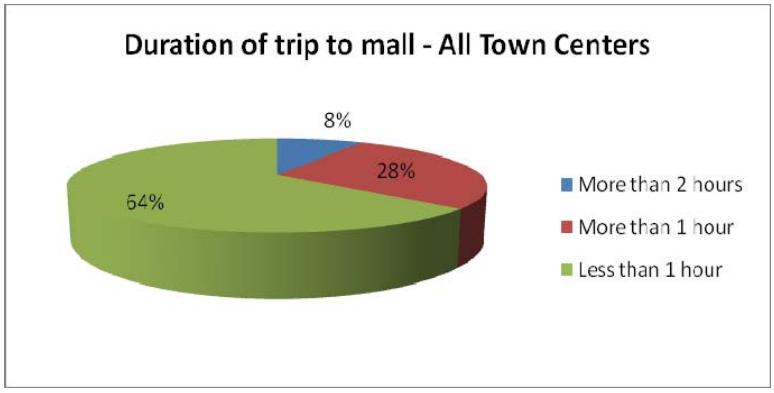


Figure A2-6: Duration of Bus Ride to Town Centers

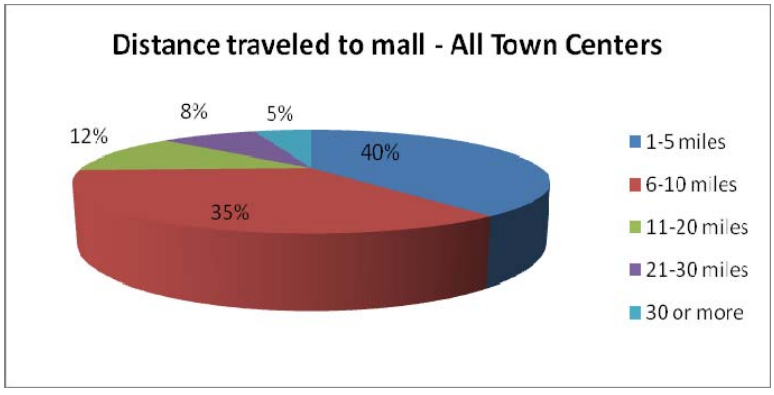


Figure A2-7: Distance Traveled to Town Centers

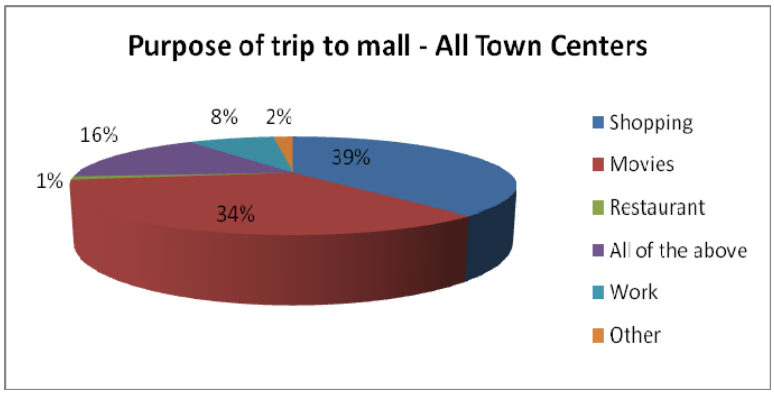


Figure A2-8: Purpose of Trip to Town Centers

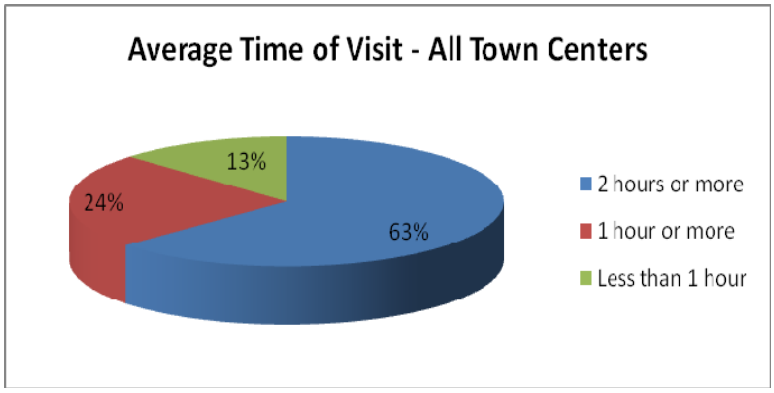


Figure A2-9: Average Length of Visit to Town Centers

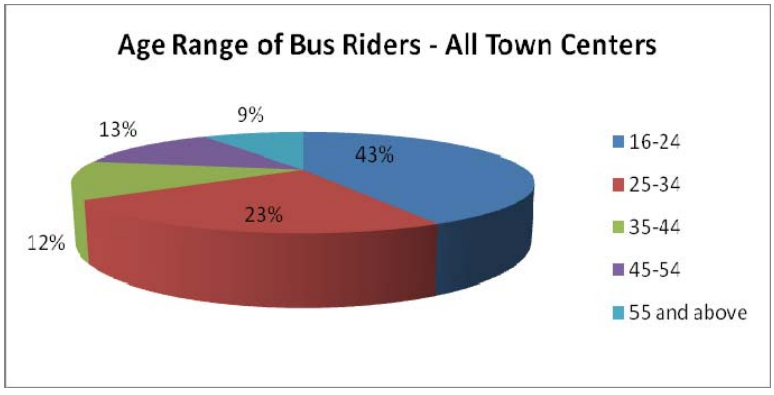
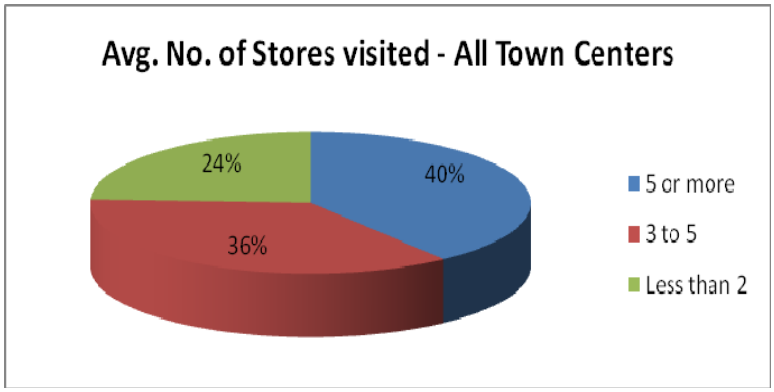


Figure A2-10: Age Range of Bus Riders to Town Centers



Appendix 2A-11: Average Number of Stores Visited at Town Centers

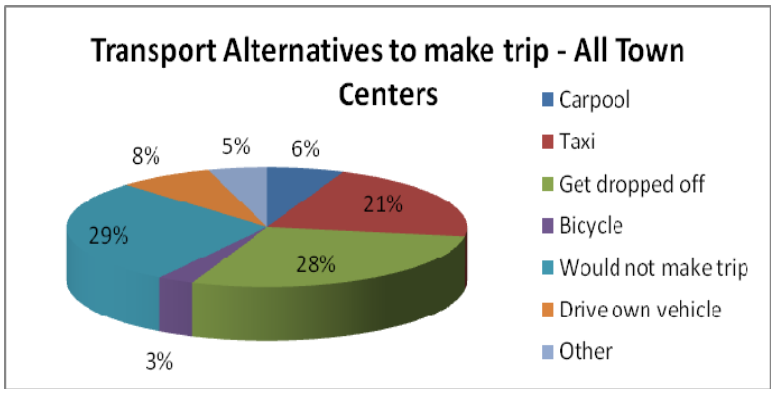
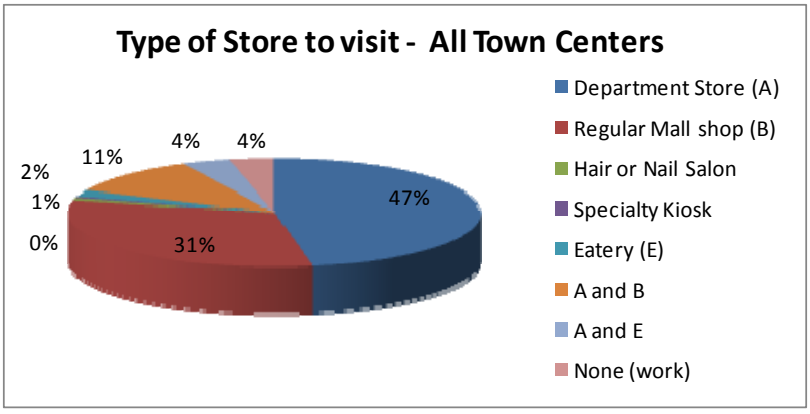
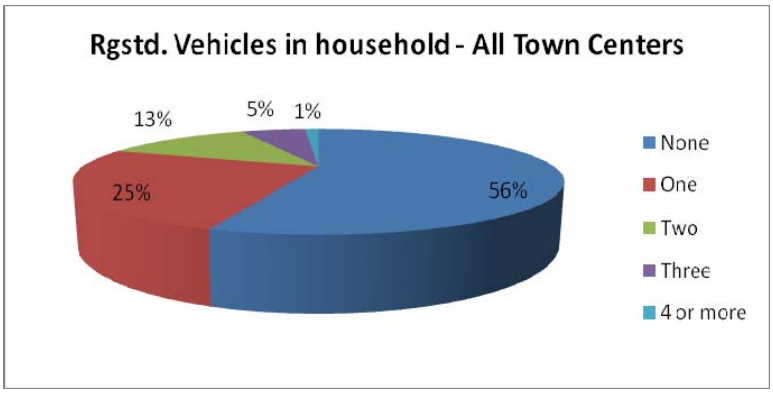


Figure A2-12: Transportation Alternatives for Bus Riders



Appendix A2-13: Type of Stores Visited at Town Centers



Appendix A2-14: Number of Registered Vehicles in Bus Rider's Household

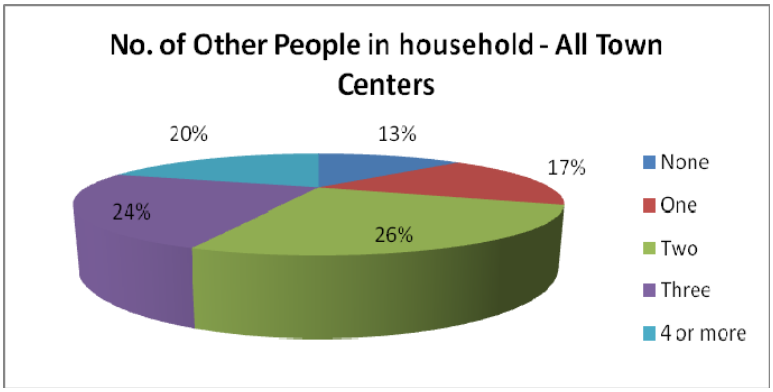


Figure A2-15: Number of Other People in Bus Rider's Household

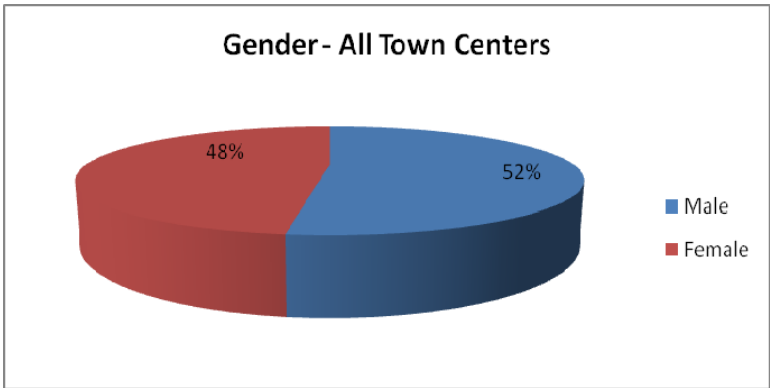


Figure A2-16: Gender of Bus Riders

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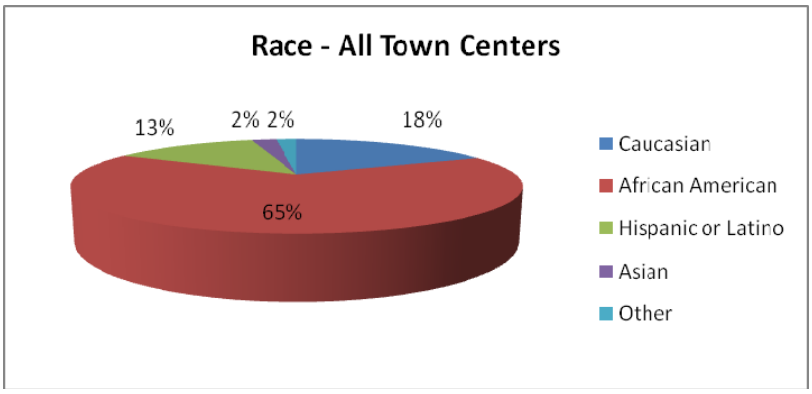


Figure A2-17: Race of Bus Riders

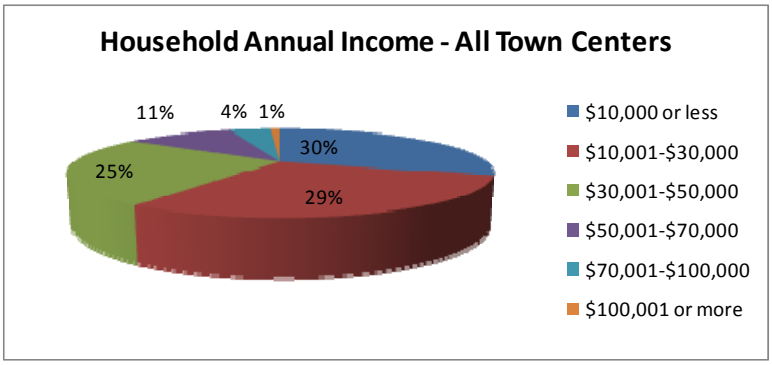


Figure A2-18: Annual Household Income of Bus Riders

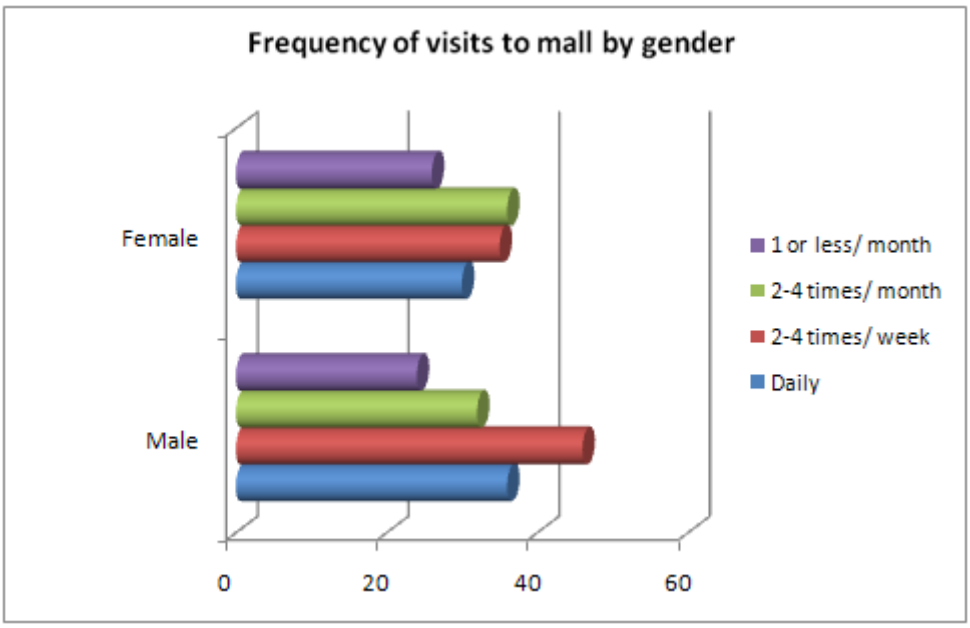


Figure A2-19: Frequency of Mall Visits by Gender

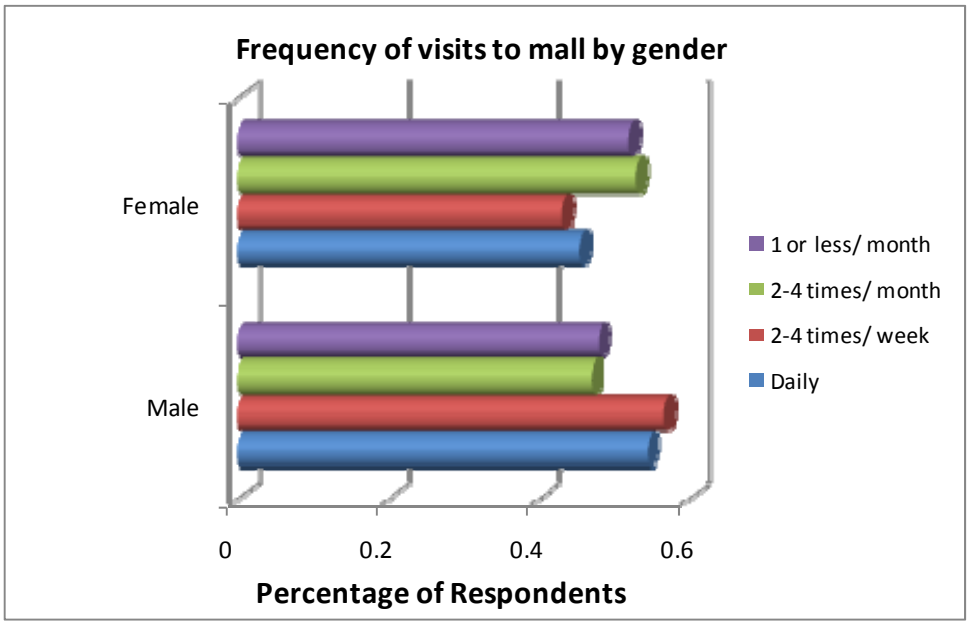


Figure A2-20: Frequency of Mall Visit by Gender

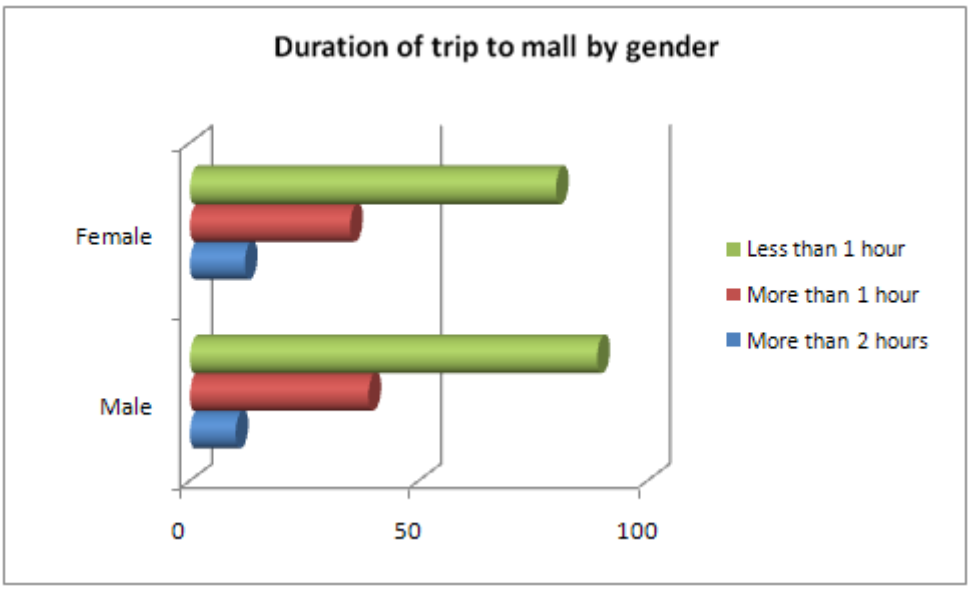


Figure A2-21: Duration of Mall Visit by Gender

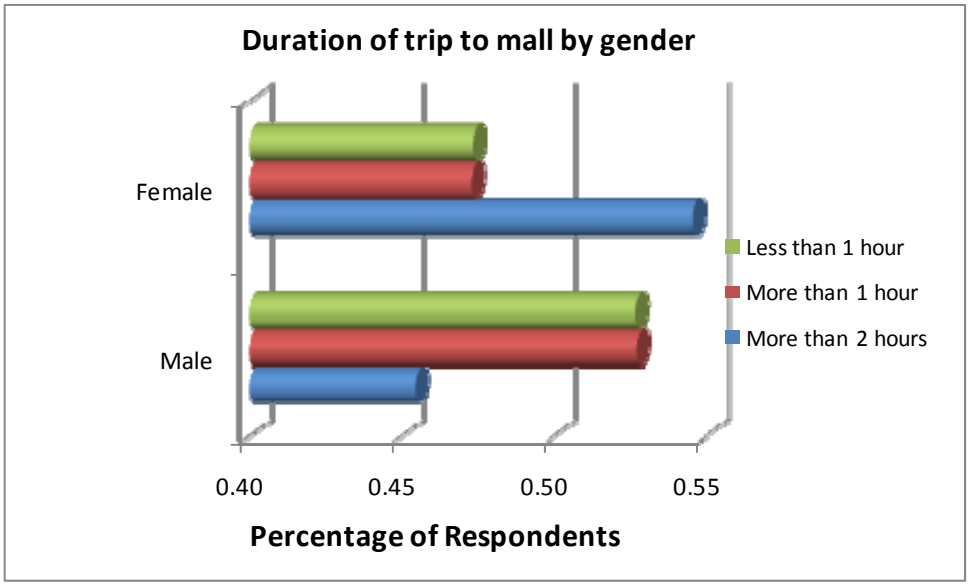


Figure A2-22: Duration of Mall Visit by Gender

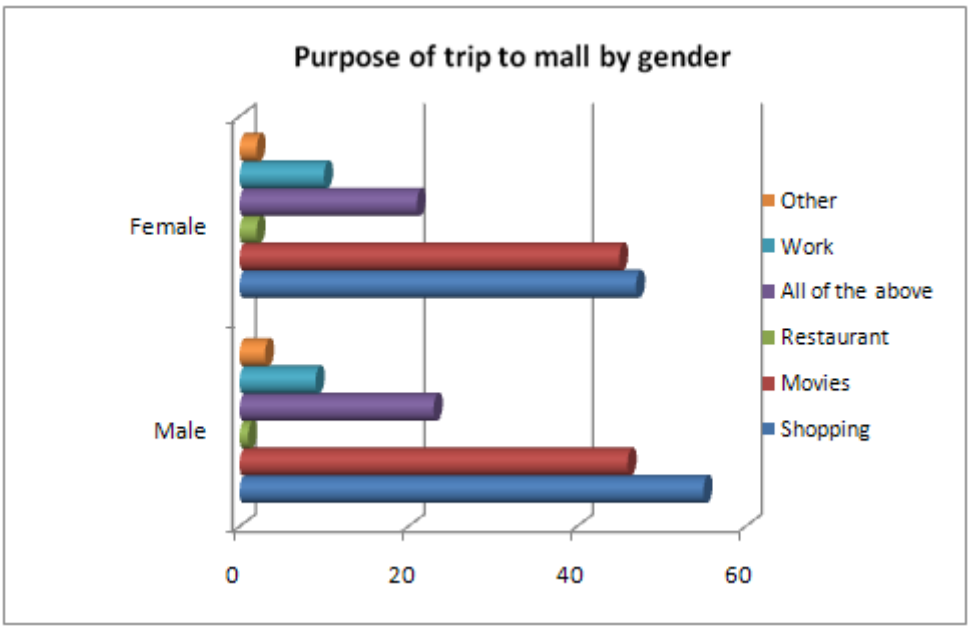


Figure A2-23: Purpose of Mall Trip by Gender

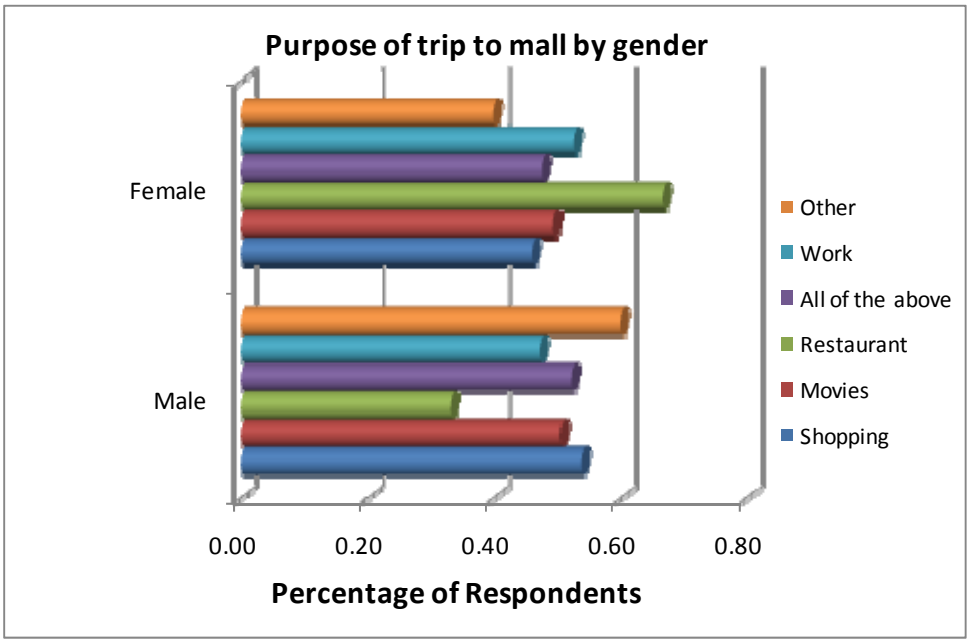


Figure A2-24: Purpose of Mall Trip by Gender

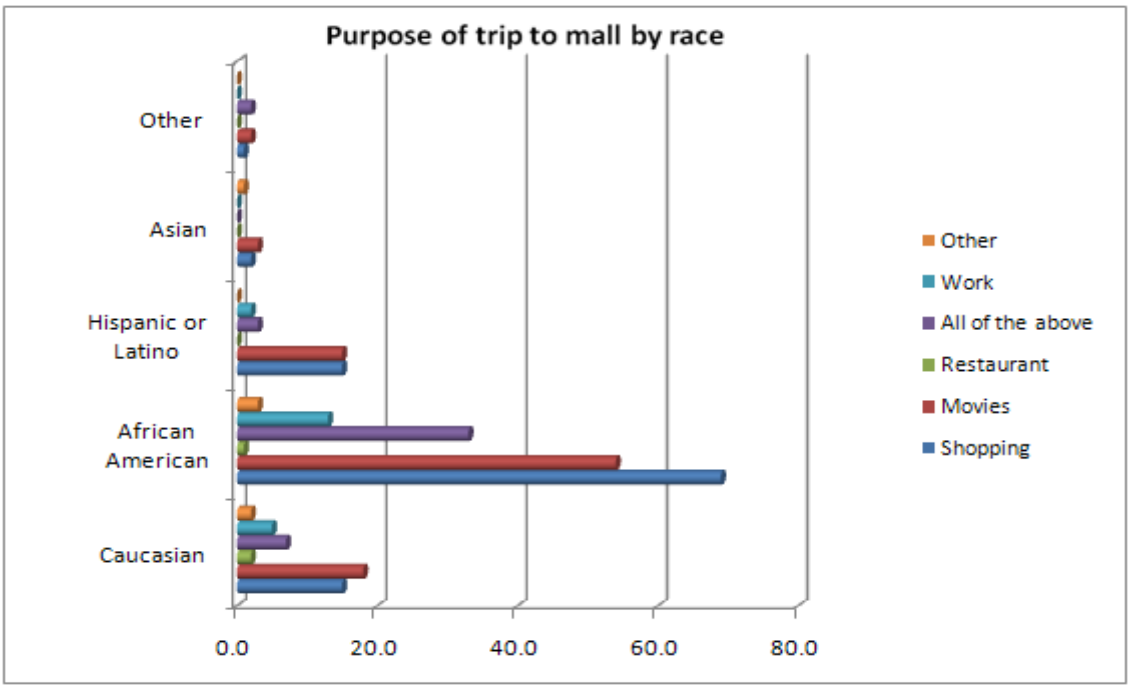


Figure A2-25: Purpose of Mall Trip by Race

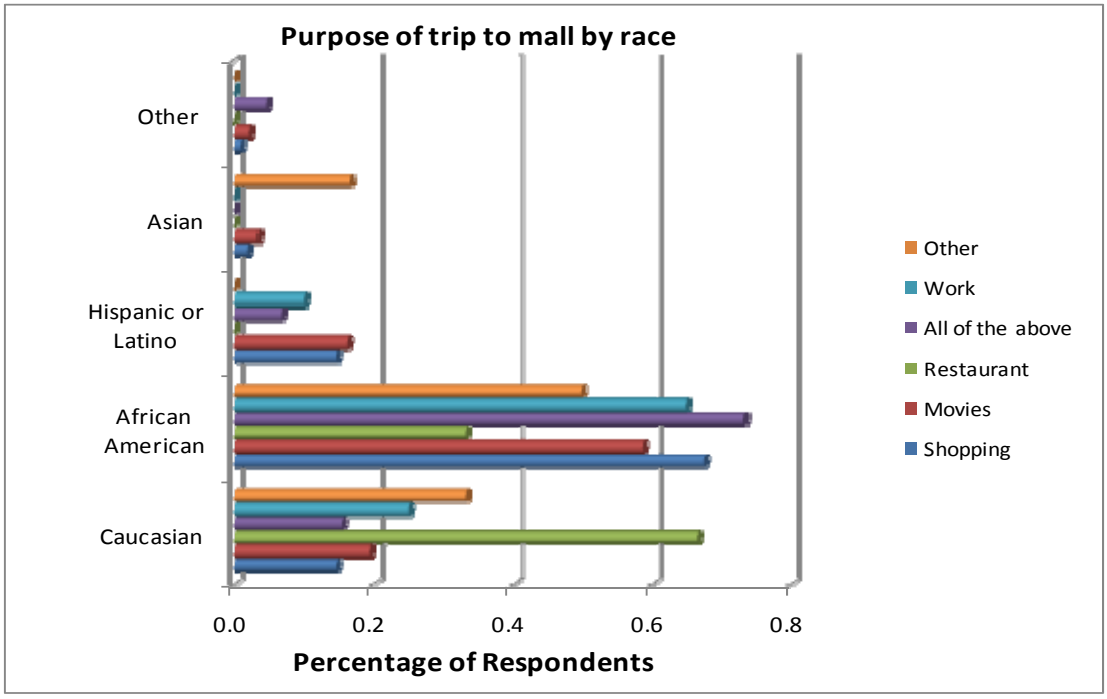


Figure A2-26: Purpose of Mall Trip by Race

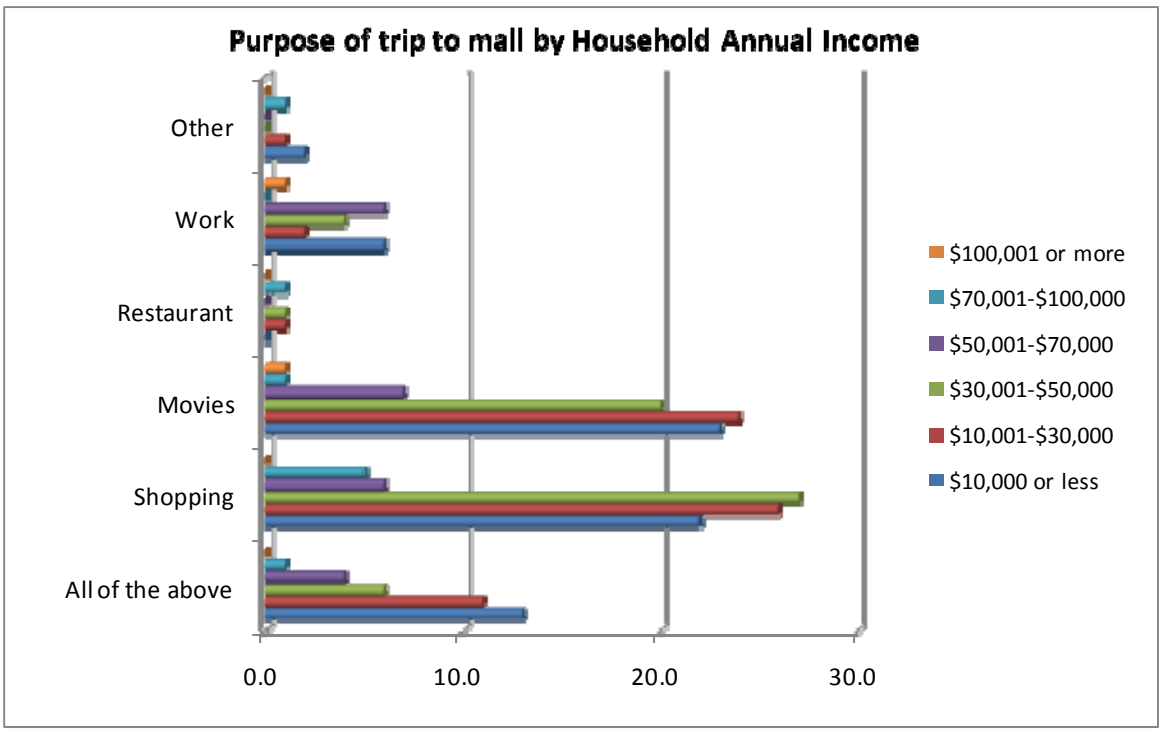


Figure A2-27: Purpose of Mall Trip by Annual Household Income

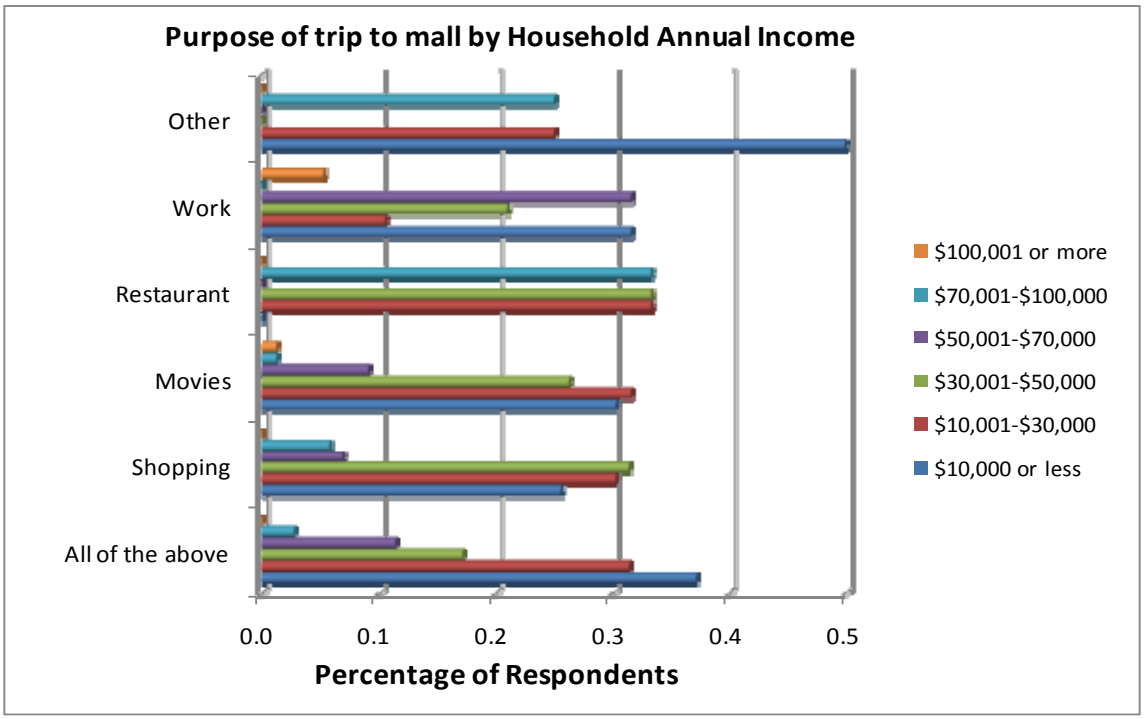


Figure A2-28: Purpose of Mall Trip by Annual Household Income

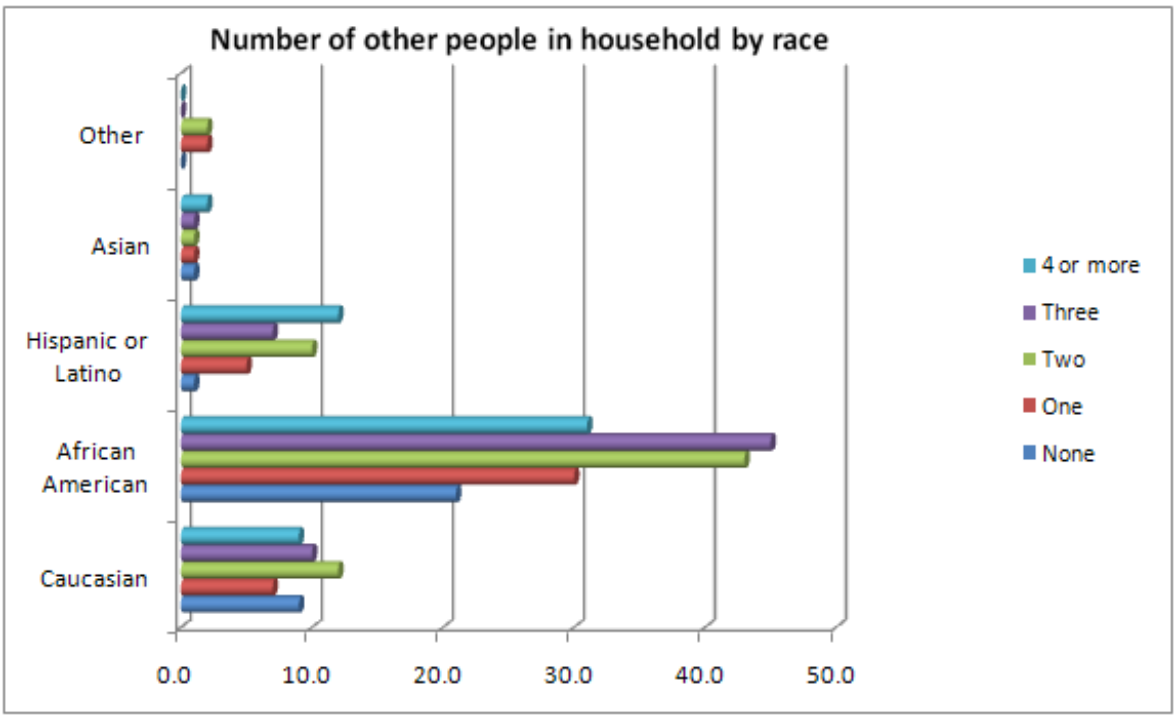


Figure A2-29: Number of Other People in Household by Race

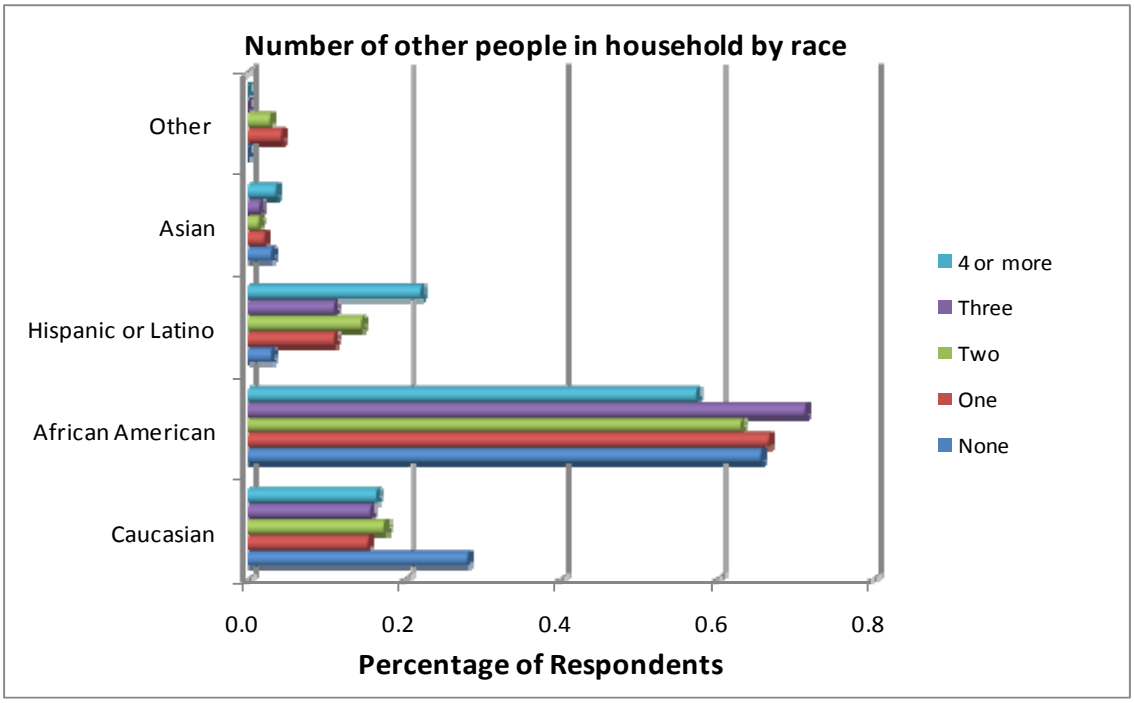


Figure A2-30: Number of Other People in Household by Race

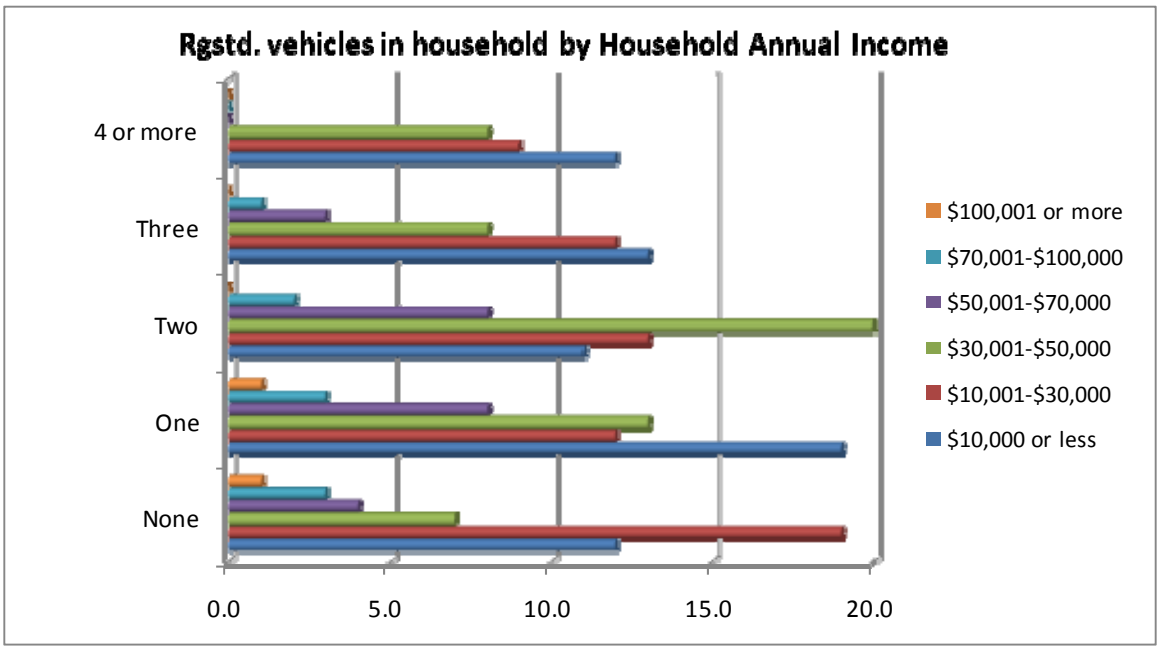


Figure A2-31: Number of Registered Vehicles in Household by Annual Household Income

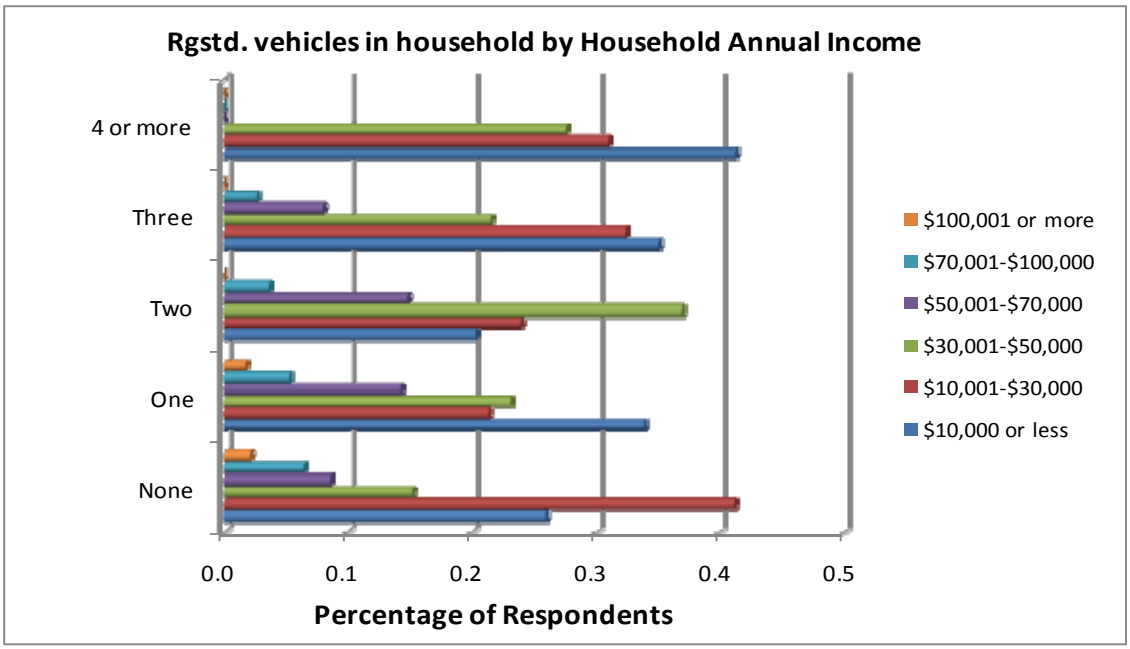


Figure A2-32: Number of Registered Vehicles in Household by Annual Household Income

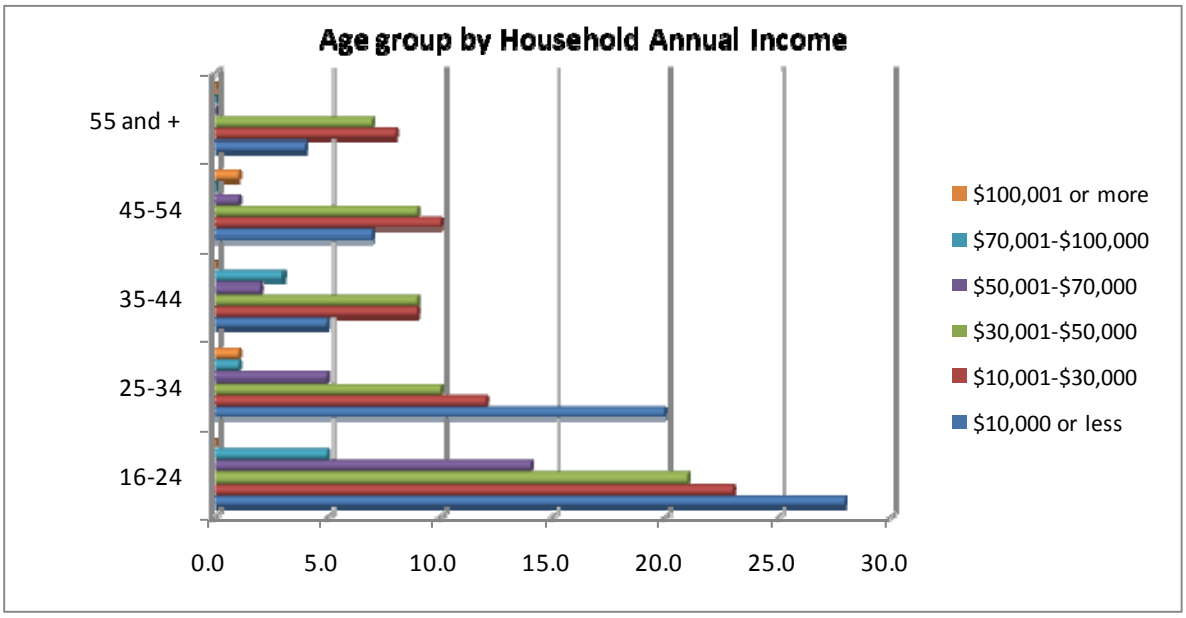


Figure A2-33: Age Group by Household Annual Income

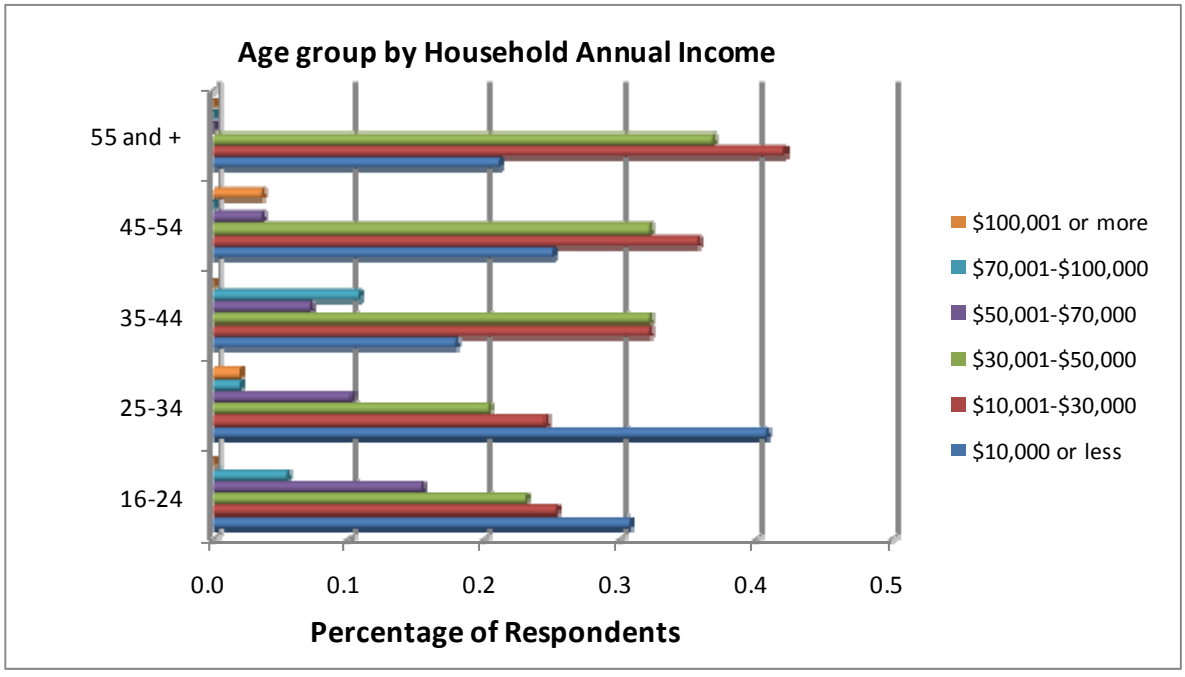


Figure A2-34: Age Group by Household Annual Income

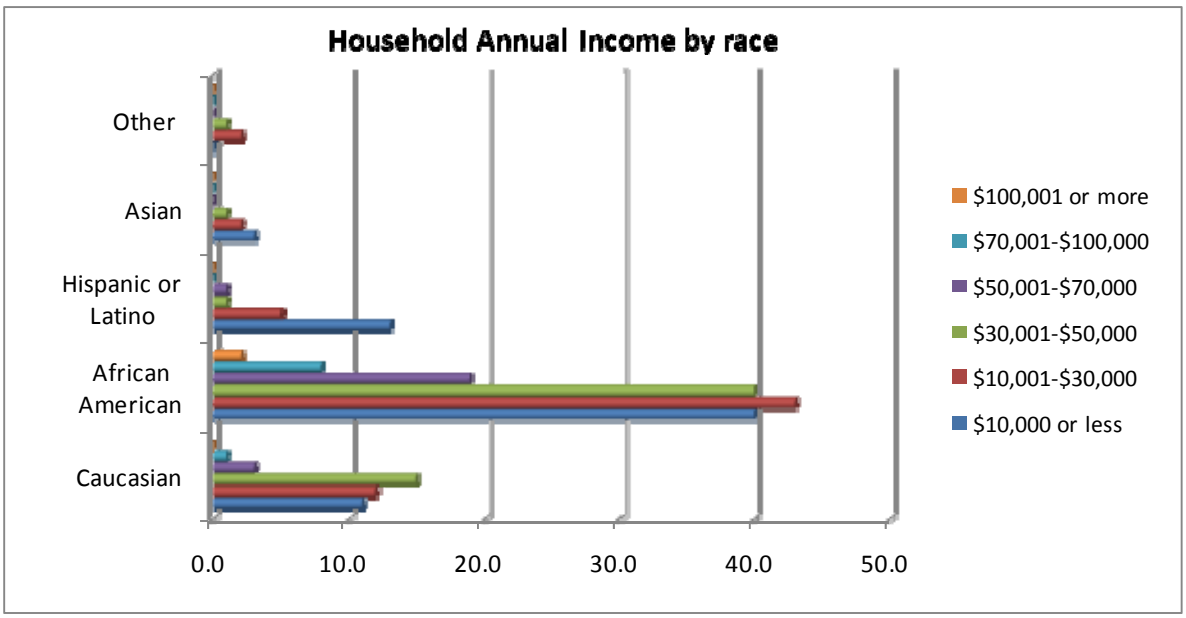


Figure A2-35: Annual Household Income by Race

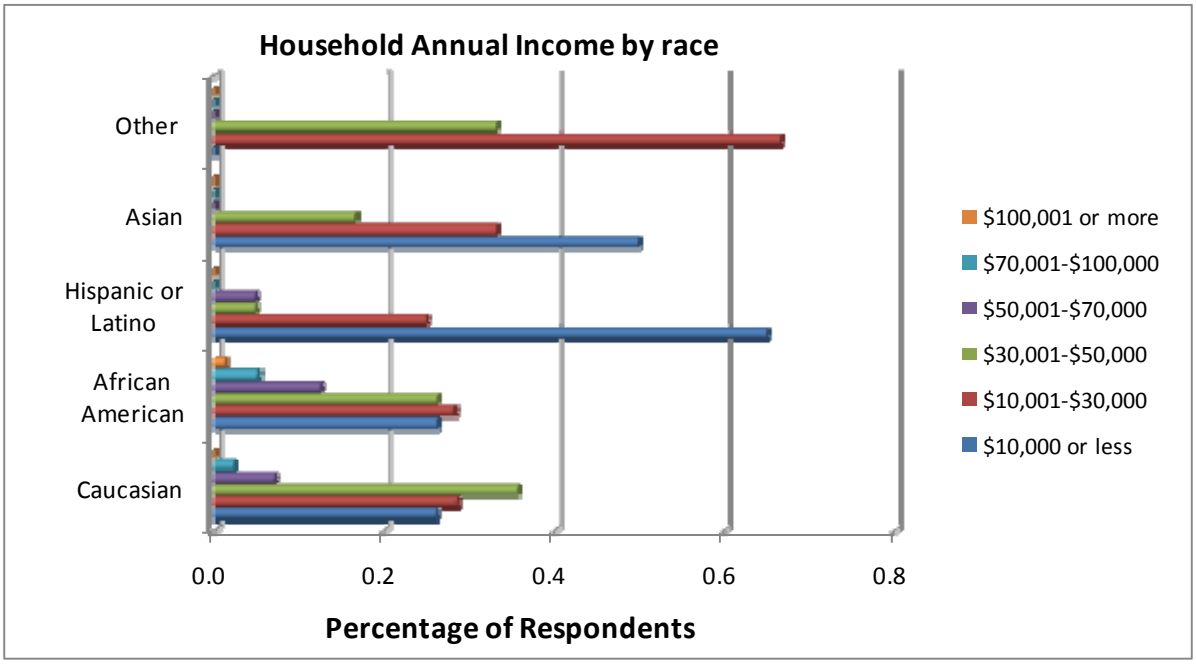


Figure A2-36: Annual Household Income by Race

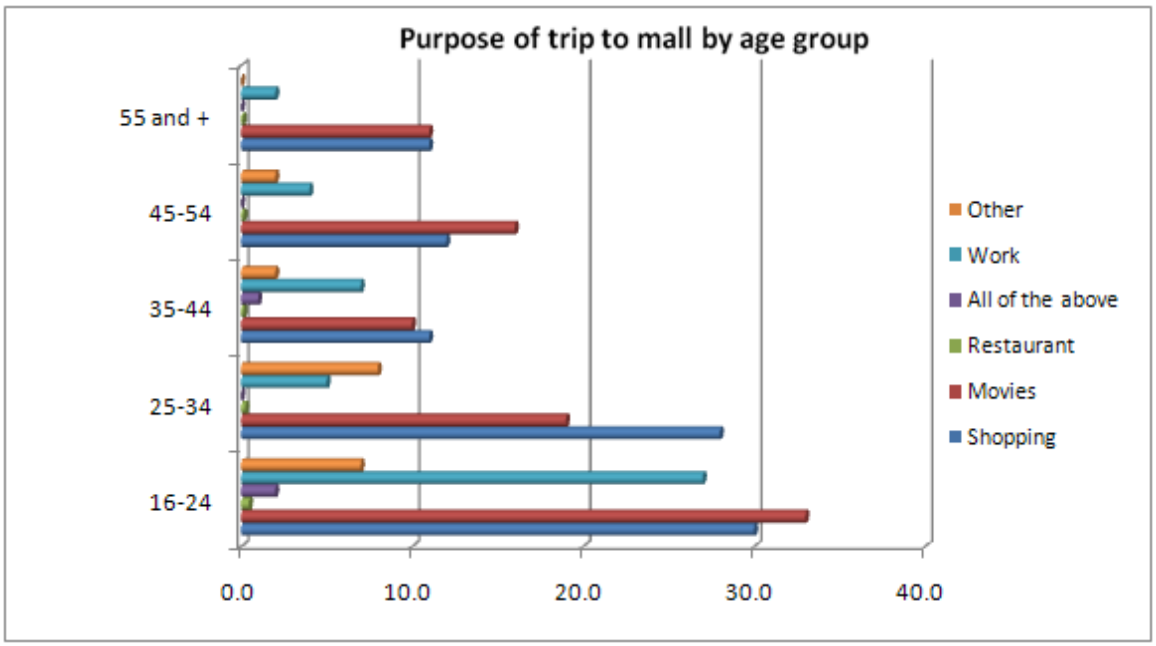


Figure A2-37: Purpose of Mall Trip by Age Group

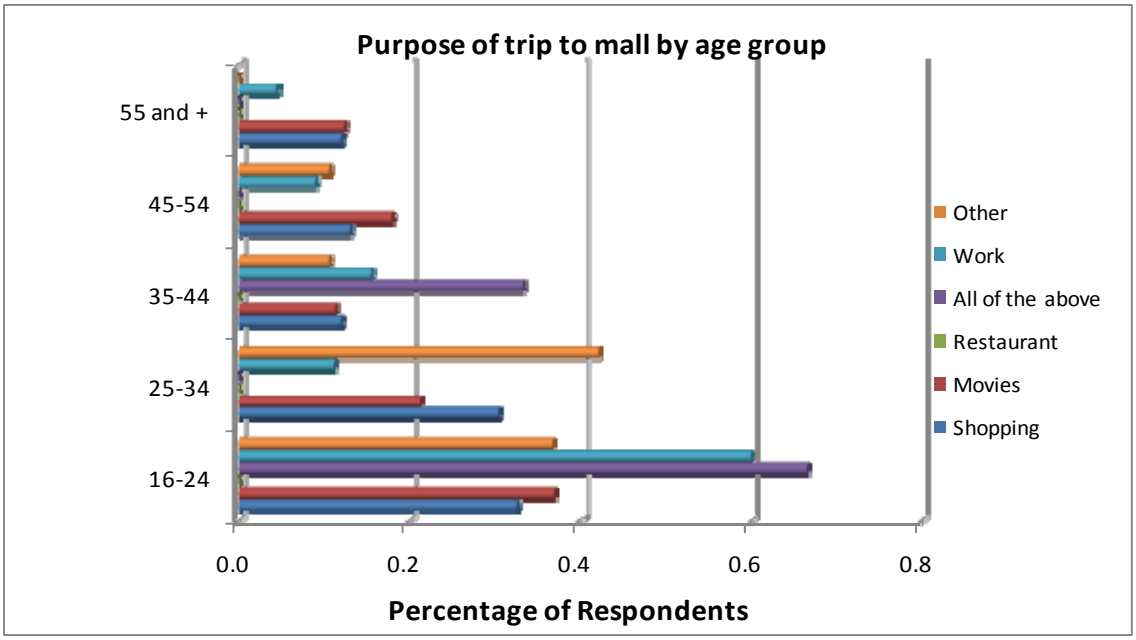


Figure A2-38: Purpose of Mall Trip by Age Group

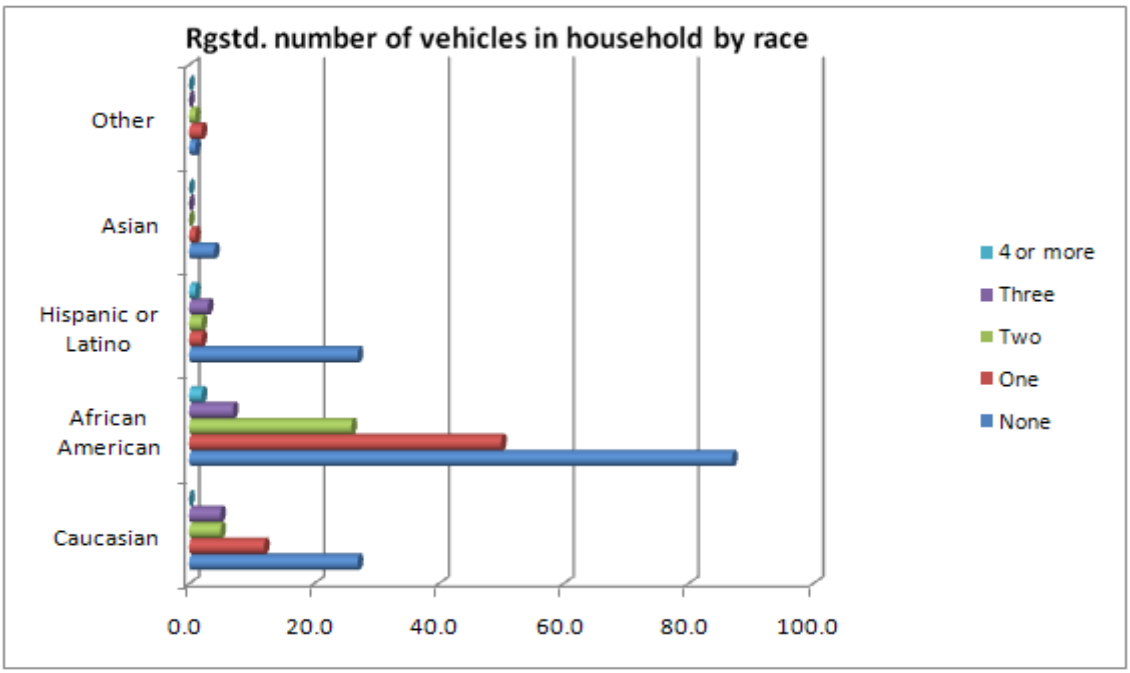


Figure A2-39: Number of Registered Vehicles in Household by Race

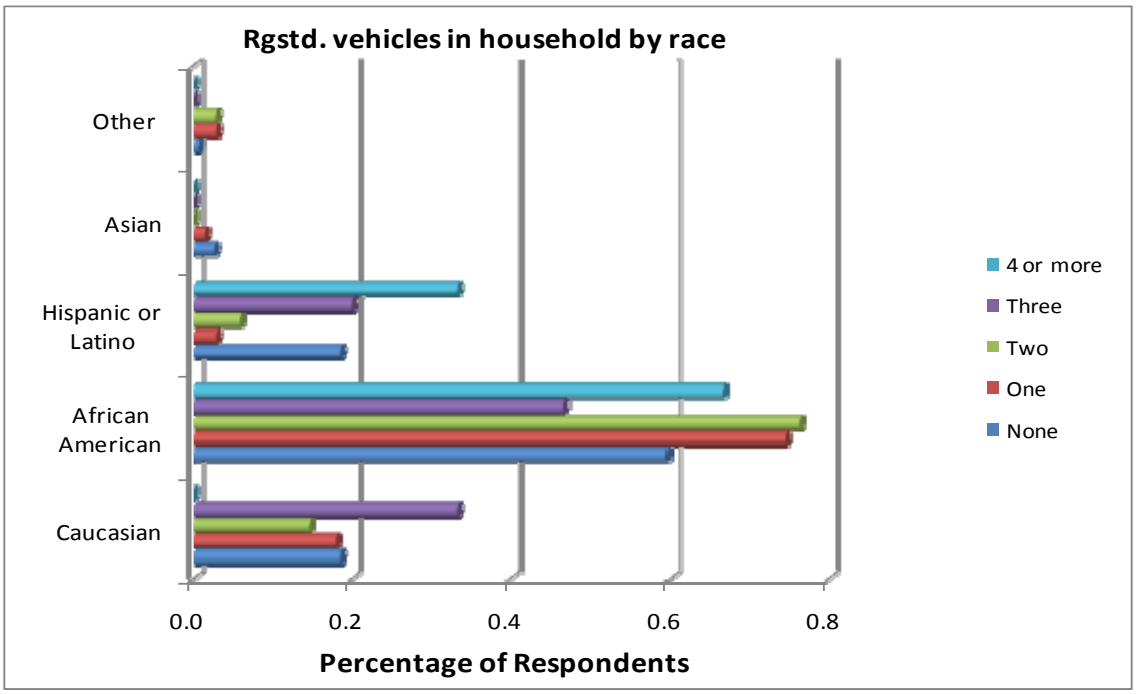
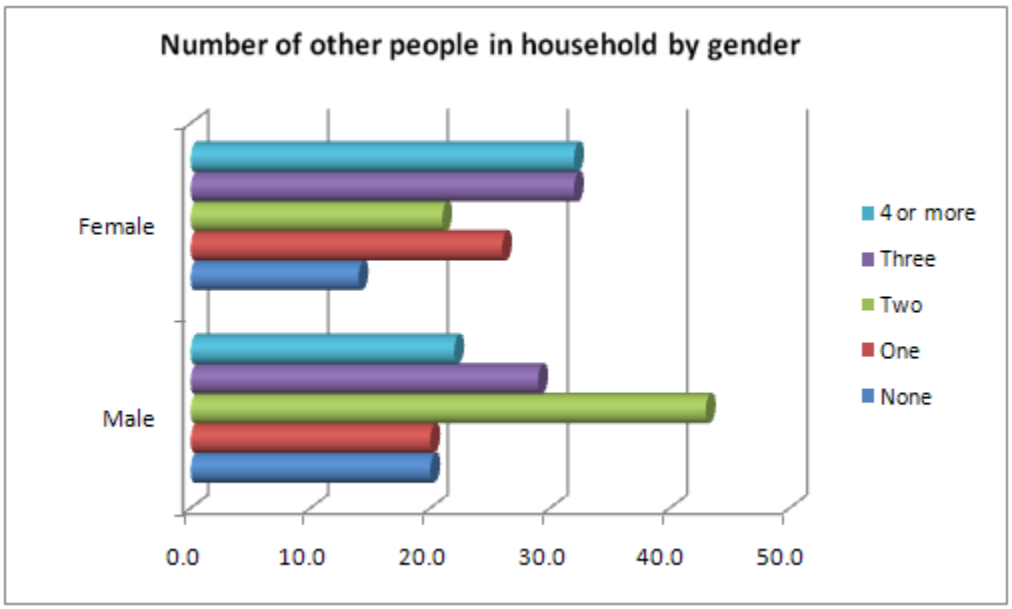
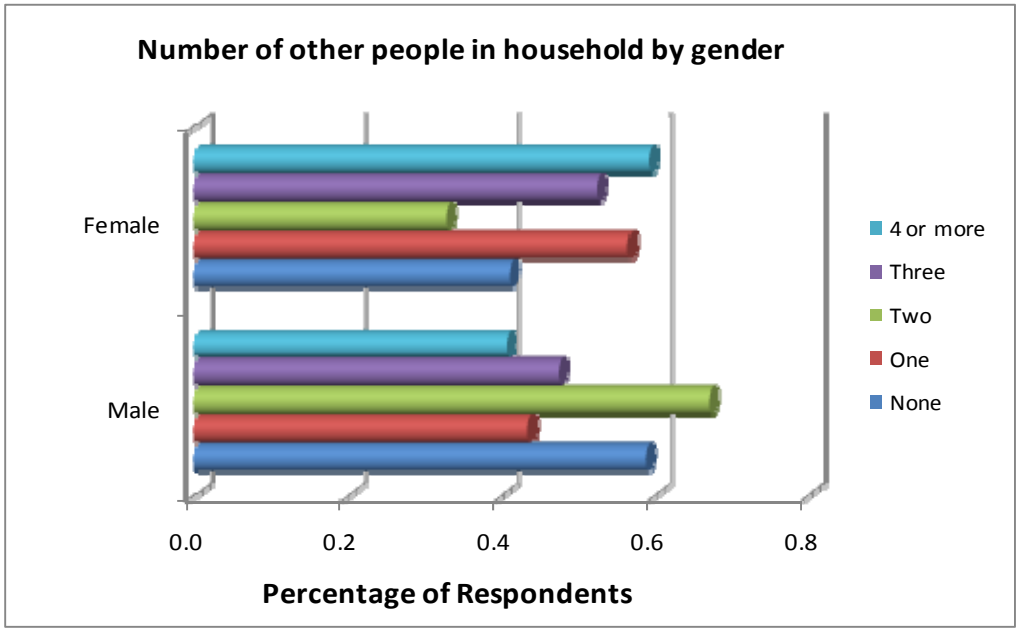


Figure A2-40: Number of Registered Vehicles in Household by Race



Appendix A2-41: Number of Other People in Household by Gender



Appendix A2-42: Number of Other People in Household by Gender

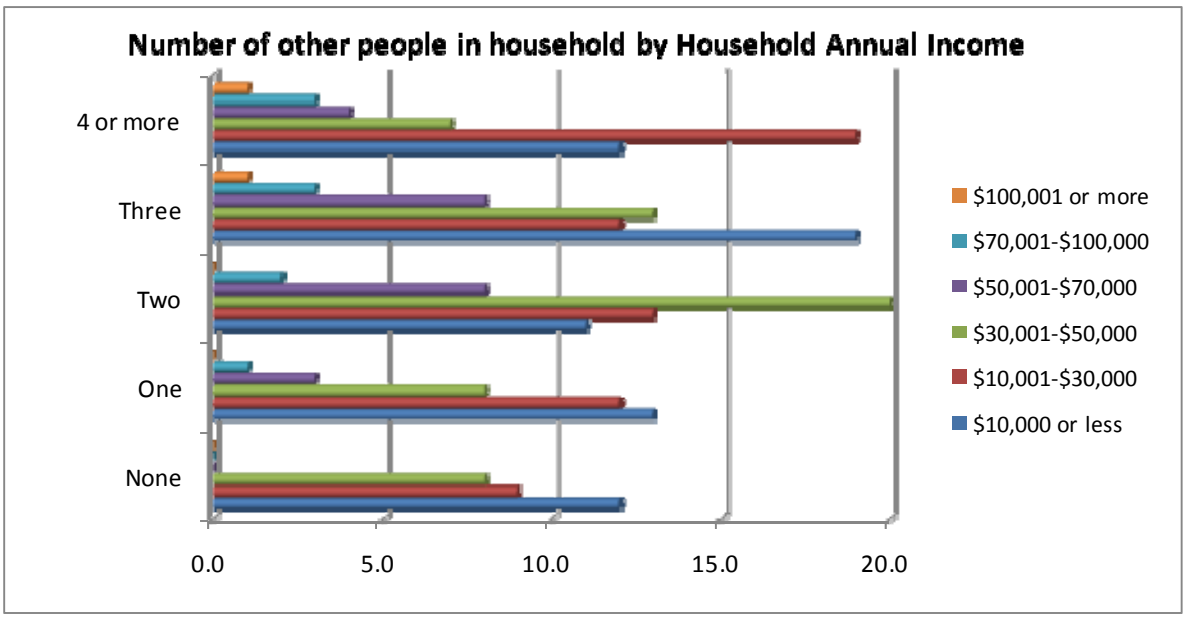


Figure A2-43: Number of Other People in Household by Annual Household Income

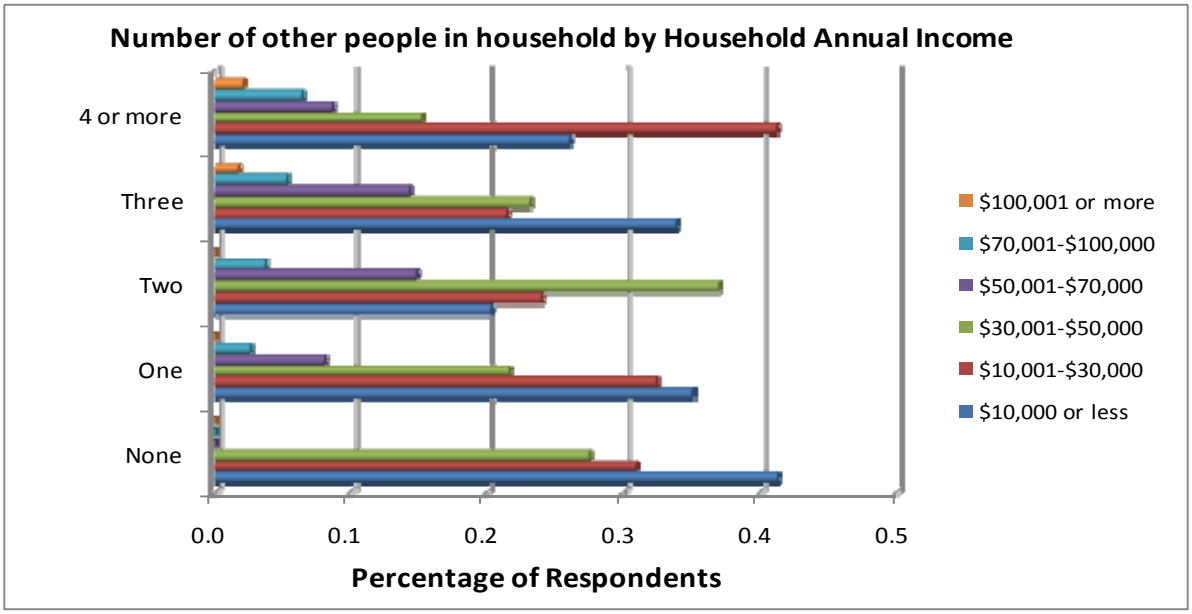


Figure A2-44: Number of Other People in Household by Annual Household Income

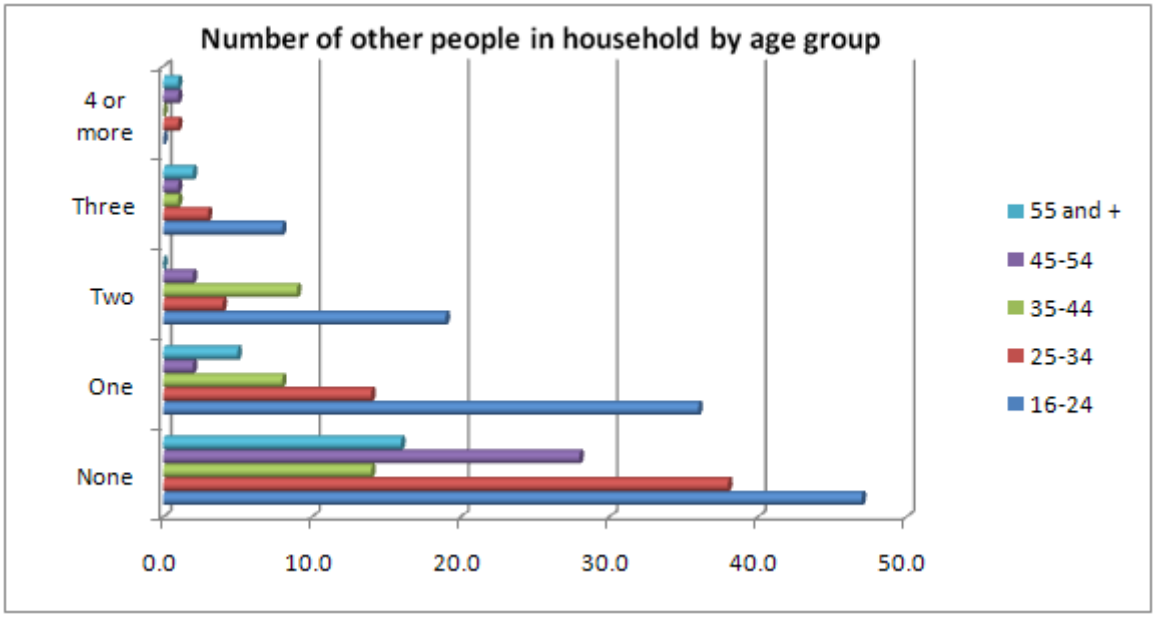


Figure A2-45: Number of Other People in Household by Age Group

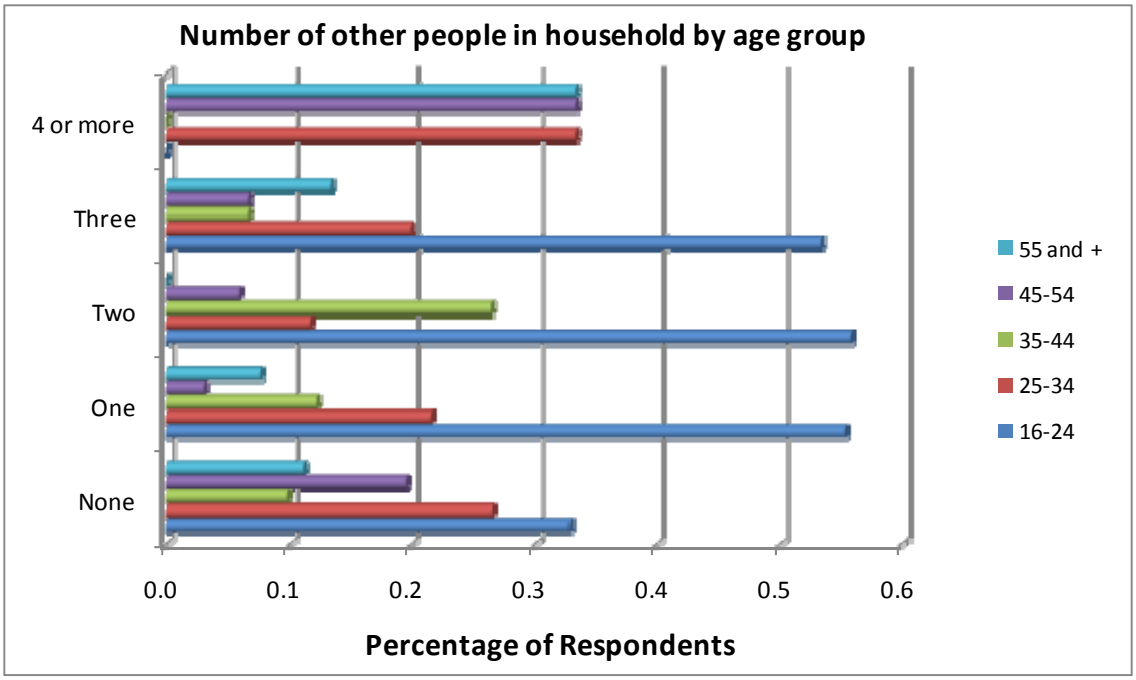


Figure A2-46: Number of Other People in Household by Age Group

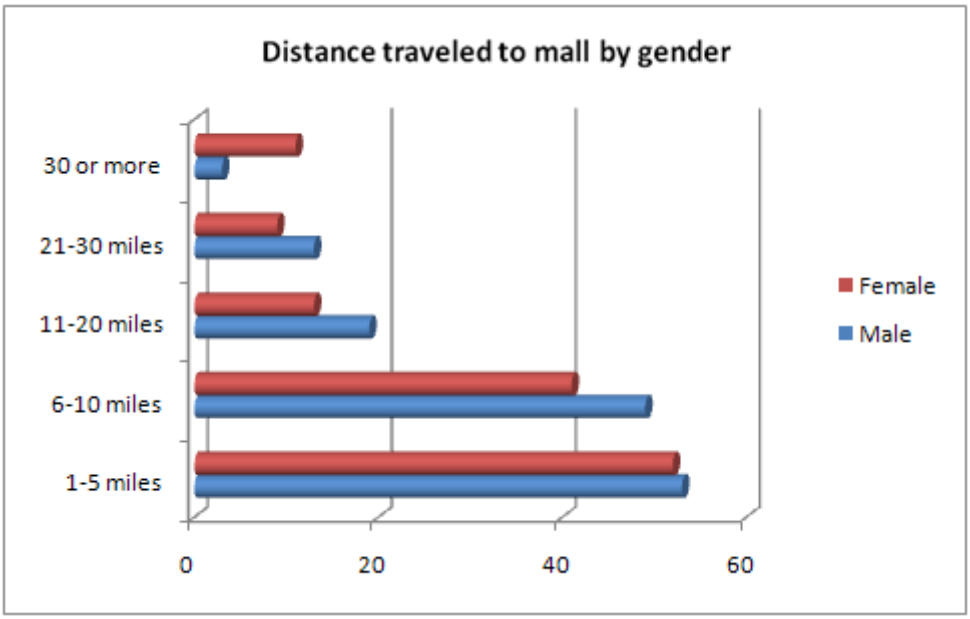
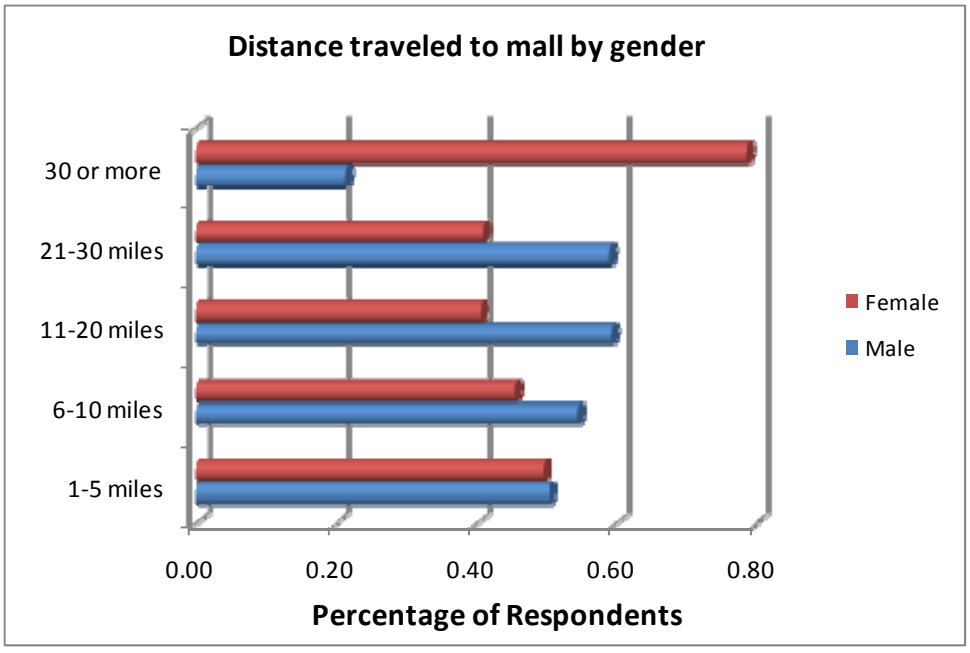


Figure A2-47: Distance Traveled to Mall by Gender



Appendix A2-48: Distance Traveled to Mall by Gender

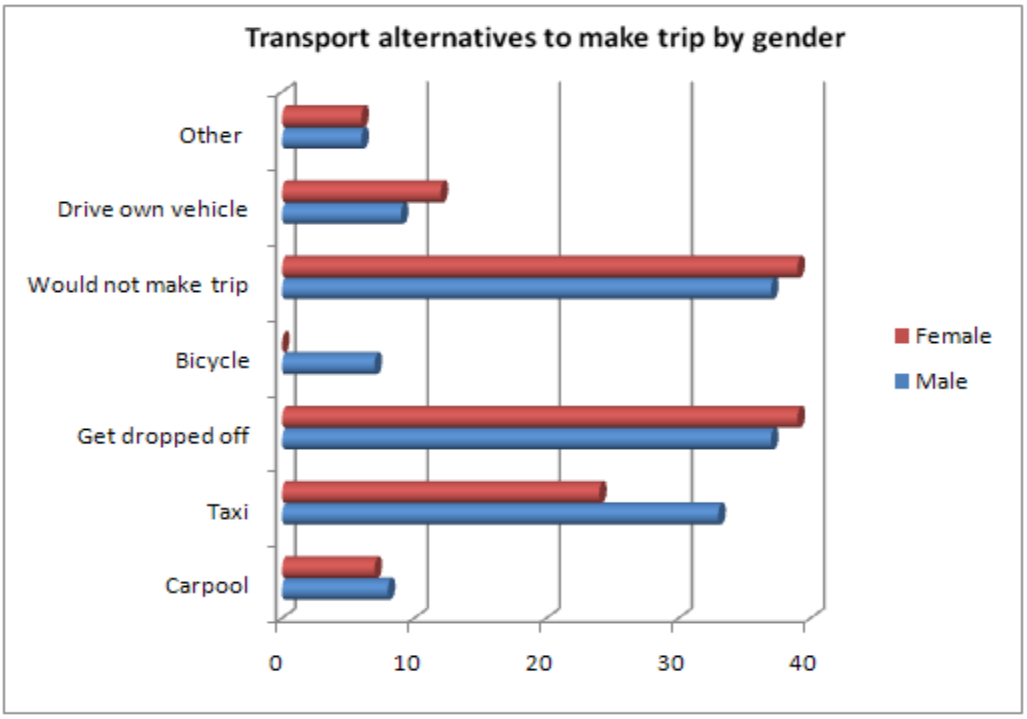


Figure A2-49: Transport Alternatives to Make Trip by Gender

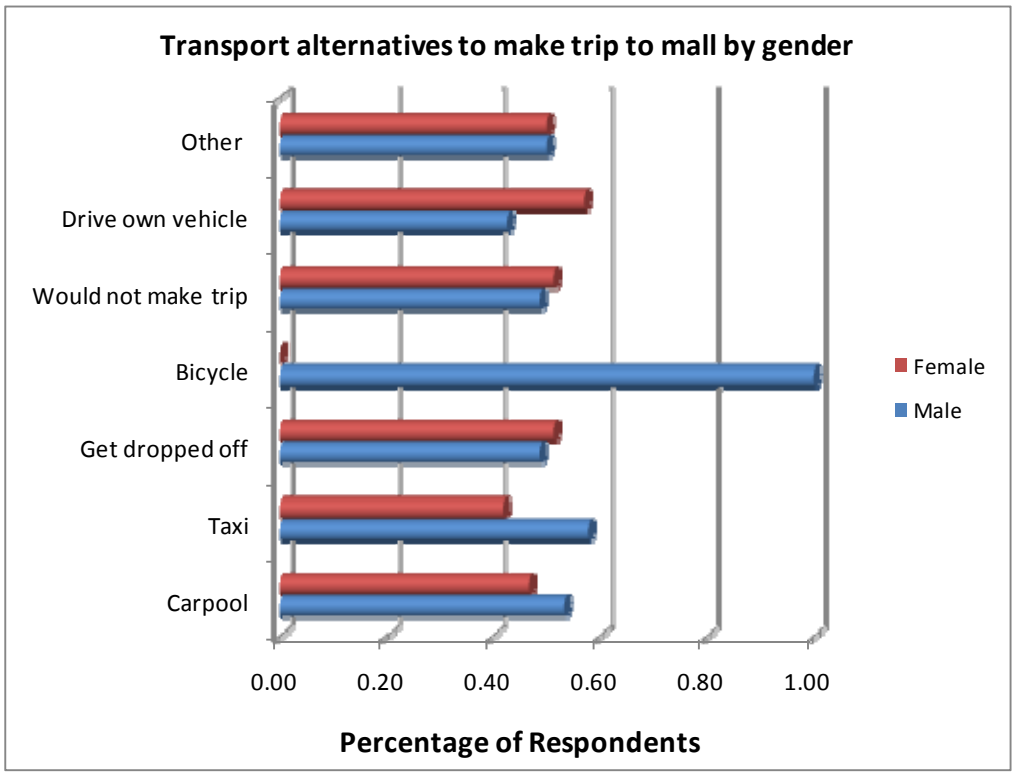


Figure A2-50: Transport Alternatives to Make Trip by Gender

APPENDIX 3

TOWN CENTER STORE LISTS

Apparel, accessories and shoes	Art, books and special retails	Services
Accessory Planet	American Greetings	XOHM
Aeropostale	As Seen On TV	A Thousand Words Photography
American Eagle Outfitters	Borders Express	Accessory Planet
Beauty Trend	Dollar Ocean	As Seen On TV
Body Central	Hallmark Gold Crown	Cartoon Cuts
Casual Gear	Oriental Treasures	Glamour Nails
Class Act	Rocky Run Restaurant	Hair 2002
Forever 21	Ruby Tuesday	Hakky Instant Shoe Repair
Frederick's of Hollywood	Spencer Gifts	LensCrafters
Gold Palace	Things Remembered	M&T Bank
Hollister Co.	Yankee Candle	Marley Tailoring
Hot Topic	**Home and furnishing**	MW Tux
Icing by Claire's	Select Comfort	Nail Trix
Journeys	**Jewelry**	Radio Shack
Kid's Footlocker	As Seen On TV	Regis Salons
Lady Foot Locker	Claire's	Ritz Camera
LensCrafters	Fred Meyer Jewelers	Sprint Nextel
Lids	Gold Palace	The Barber Shop
Memento Store	Gordon's Jewelers	T-Mobile
NASCAR Racewear	Kay Jewelers	Verizon Wireless
New Age Accessories.	Littman Jewelers	Wonderful Signature Salon
New York & Company	Monica Jewelers	**Dinning and grocery**
Oriental Treasures	Royal Jewelers	Auntie Anne's Pretzels
PacSun	Shaw's Jewelers	Boardwalk Fries
Piercing Pagoda	Whitehall Co. Jewellers	Caffe Euro
Radio Shack	Zales Jewelers	Chick-fil-A
Rainbow	**Entertainment**	China Bowl
Rave	fye - For Your Entertainment	Cinnabon
Signature Sports	Game Stop	Funnel Fare
Spencer Gifts	Regal Cinemas	GNC
The Sports Page	Ritz Camera	Godiva Chocolatier
Things Remembered	Sprint Nextel	Hershey's Ice Cream
Victoria's Secret	**Health and lifestyle**	Pretzel Time
Victoria's Secret Beauty	As Seen On TV	Rita's Italian Ice
Vivace	Bath & Body Works	Rocky Run Restaurant
Yankee Candle	Beauty Trend	Ruby Tuesday
Department store	Cartoon Cuts	Sbarro
JCPenney	Claire's	Subway
Macy's	Fragrances Unlimited	Taco Bell
Sears	Glamour Nails	**Children**
Athletic and sporting goods	GNC	Children's Place
Kid's Footlocker	Gold's Gym	Icing by Claire's
Champs Sports	Hair 2002	Kid's Footlocker
Finish Line	Regis Salons	Limited Too
Foot Locker	Trade Secret	Oriental Treasures
Journeys	Victoria's Secret	Rainbow
Lady Foot Locker	Victoria's Secret Beauty	Stride Rite Shoes
Lids	Wonderful Signature Salon	
Signature Sports		
The Sports Page		

Table A3-1: Shopping, Entertainment, and Service Alternatives at TC4

Apparel, accessories and shoes	Apparel, accessories and shoes	Dinning and grocery	Home and furnishing
Aeropostale	Torrid	Arby's	Kids' Quarters
Aldo	VANS	Auntie Anne's	Kirkland's
American Eagle Outfitters	Victoria's Secret	Bistro Sensations	Sleep Number by Select Comfort
Bags, Beads and Beyond	Wet Seal	Buffalo Wild Wings	Thomas Kinkade Gallery
Bakers	Zumiez	Burger King	**Technology**
Beauty Outlet	**Athletic and sporting goods**	Cajun Gourmet	AT&T Wireless
Christopher & Banks	Dollar Tree	Chicken King/Boardwalk Fries	Best Buy Mobile
Bostonian	Driving Impressions	Chick-fil-A	Beyond Electronics
Claire's	General Nutrition Center	Cinnabon	GameStop Lower Level
Downtown Locker Room	Lids	Dairy Queen/Orange Julius Treat Center	GameStop Upper Level
Dressbarn	Life Uniform	Friendly's	Mobile Solutions
Easy Spirit	Motherhood Maternity	Fuddruckers	Radio Shack
Express	Oriental Concepts	G'Lato d' Italia	Ritz Camera Center
Express Men	News Stand	Great Cookie, The	Sprint
Finish Line	Picture People, The	Great Steak & Potato Co.	T-Mobile
Foot Locker	Savvi	Lin's China Buffet	**Services**
Footaction USA	Starbucks	Mamma Ilardo's Pizzeria	7-Eleven/Citgo
Forever21	Sunglass Hut	Olive Garden Restaurant	ATM Chevy Chase
Gap	Sweet Factory	Oriental Express	Cartoon Cuts
Gossip	Time Factory	P.F. Chang's	Customer Service
H&M	White Marsh Pet Center	Ruby Tuesday	Elite Spa
Hollister	**Health and lifestyle**	Sarku Japan	Fast-Fix Jewelry & Watch Repairs
Hot Topic	Bath & Body Works	Subway	Hakky Shoe Repair
Icing, The	Beauty Outlet	Wendy's Restaurant	Heakin Research
Journeys	Body Shop, The	Wockenfuss Candies	Lenscrafters
Journeys Kidz	Cartoon Cuts	**Jewelry**	London Tailors
Jump Sportsware	Elite Spa	Fast-Fix Jewelry & Watch Repairs	MasterCuts
Kids Foot Locker	MasterCuts	Fire & Ice	Meridian Health
Kids Shoe Adventure	Meridian Health	Helzberg Diamonds	Nail Elite
Lady Foot Locker	Merle Norman	Jared The Galleria of Jewelry	News Stand
Lane Bryant	Nail Elite	Kay Jewelers	Pearle Vision
Last Stop	Perfume Galaxy	Littman Jewelers	Picture People, The
Limited, The	Regis Hairstylists	Piercing Pagoda	Regis Hairstylists
Men's Wearhouse	Trade Secret	Reeds Jewelers	Ritz Camera Center
New York & Company	Victoria's Secret Beauty	Shaw's Jewelers	Trade Secret
PacSun	**Children**	Whitehall Co. Jewellers	**Art, books and special retails**
Payless ShoeSource	babyGap	Zales Jewelers	Borders Express
Pretty Woman	Children's Place, The	**Department store**	Carlton Cards
Rockport Shoes	Disney Store, The	IKEA	Hallmark Gold Crown
rue21	Disney Store, The	JCPenney	Spencer Gifts
Savvi	GapKids	Macy's	Suncoast Motion Picture Company
Shoe Dept., The	Gymboree	Macy's Home Store	Things Remembered
Shoe Haven	Justice	Sears	
Sunglass Hut	KB Toys		
Time Factory	Kids Shoe Adventure		

Table A3-2: Shopping, Entertainment, and Service Alternatives at TC1

Apparel, accessories and shoes	Art, books and special retails	Services
Aeropostale	AMC Owings Mills 17	Convenience Corner
American Eagle Outfitters	Borders Express	Glamour World
Ashley Stewart Women	Brookstone	Hakky Cobblers & Tailors
Athlete's Foot	Carnival Delights	JCPenney Optical/ Photo
Claire's Accessories	General Nutrition Center	Lenscrafters
Deb Shop	Hallmark Gold Crown	MasterCuts
Downtown Locker Room	Kre8ing Your Ideas	Ritz Camera Center
Estillo Shoes	Oriental Treasures	T-Mobile
Express	Spencer's Gifts	Trade Secret
Finish Line	Things Remembered	**Jewelry**
Foot Locker	Yankee Candle Company	Claire's Accessories
Forever 21	**Athletic and sporting**	Crown Jewelry & Repair
H&M	Chizel It	Icing
Hats N More	Shenk & Tittle	Kay Jewelers
Hot Topic	**Department store**	Littman Jewelers
Hyatt & Company	JCPenney	Piercing Pagoda
Icing	Macy's	Reeds Jewelers
Lady Foot Locker	**Dinning and grocery**	Time & Time Again
Lane Bryant	A & D Buffalo's	Zales Jewelers
Men's Wearhouse and Tux	Bourbon Street Café	**Technology**
Milano	Cheese Steak Grill	Cellairis
Motherhood Maternity	Chick-fil-A	Game Stop
My Bag	Don Pablo's Mexican	Mobile Solutions
Naturalizer	Dragon House Express	Radio Shack
New York & Company	Jasmine Bubble Pearl Tea	Sprint
Nine West	Mamma Ilardo's Pizzeria	Verizon Wireless
Orange	Mrs. Field's Cookies	Wireless Expert
Payless ShoeSource	Nan's Gourmet Ice Cream	**Health and lifestyle**
Rave	Red Lobster	Angel Nails
Shenk & Tittle	Red Robin	Bath & Body Works
Shingar	Ruby Tuesday	Beauti's
Shoe Department	Salads,Wraps & More	MasterCuts
Step It Up	Sarku Japan	Nail Trix & Spa
Stride Rite	Subway	Perfumery
Underground Station	Tony Roma's	Rafet's Hairmasters
Victoria's Secret	**Children**	Trade Secret
Wet Seal	Children's Place	**Home and furnishing**
	Gymboree	International Furniture Liquidators (IFL)
		Oriental Home Decor

Table A3-3: Shopping, Entertainment, and Service Alternatives at TC3

Apparel, accessories and shoes	Art, books and special retails
Ann Taylor Loft	Butler Gallery
Capitol Luggage and Leather	Tomlinson Craft Collection
Coldwater Creek	Greetings & Readings
Filene's Basement	Ritz Camera
Olly Shoes	**Athletic and sporting goods**
Box of Rain	Dick's Clothing & Sporting Goods
Chico's	Soccertowne
Dick's Clothing & Sporting Goods	**Department store**
Jos. A. Bank Clothier	Sears
The Wardrobe Ladies & Maternity & Baby	**Dinning and grocery**
Burlington Coat Factory	California Pizza Kitchen
Claire's	Carmine's New York Pizzeria
DSW Shoe Warehouse	Chipotle Mexican Grill
New York & Company	Greystone Grill
Wavedancer	Outback Steakhouse
White House | Black Market	Sakura
Entertainment	Calvert Wine & Spirits
EB Games	Carraba's Italian Grill
Regal Cinemas	Damon's Grill
Soccertowne	Jesse Wong's Kitchen
Home and furnishing	Carvel Ice Cream
Brandon Home Furnishings	Gelato Factory
Butler Gallery	Noodles and Company
Plow & Hearth	Quiznos Sub
Services	Wegmans Food Market
Cingular Wireless	**Health and lifestyle**
Sun Trust Bank	Spa in the Valley, a Salon by Debbie
M&T Bank	Ulta Salon
Pearle Vison	

Table A3-4: Shopping, Entertainment, and Service Alternatives at TC2

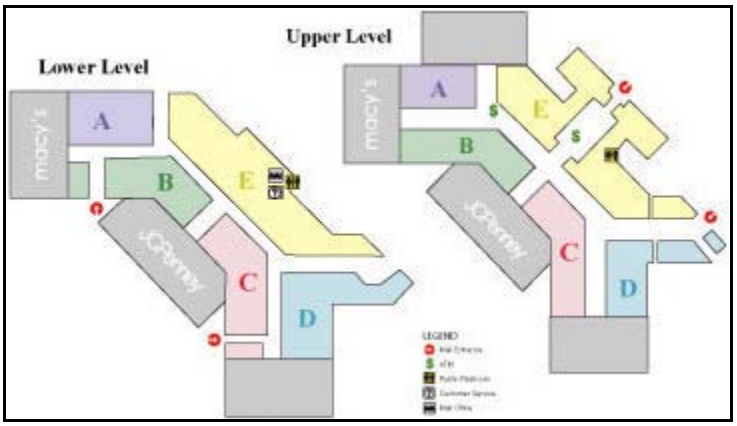


Table A3-5: Store Directory for TC3

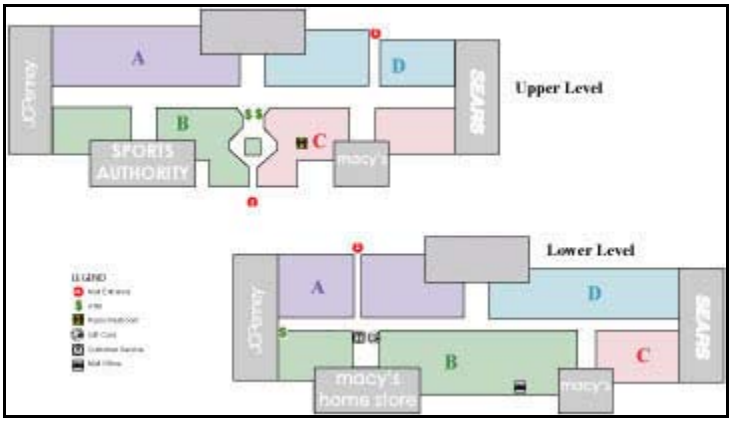


Table A3-6: Store Directory for TC1

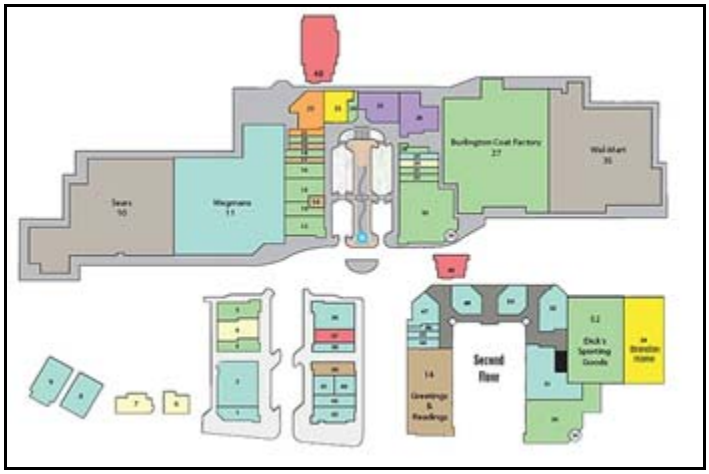


Table A3-7: Store Directory for TC2

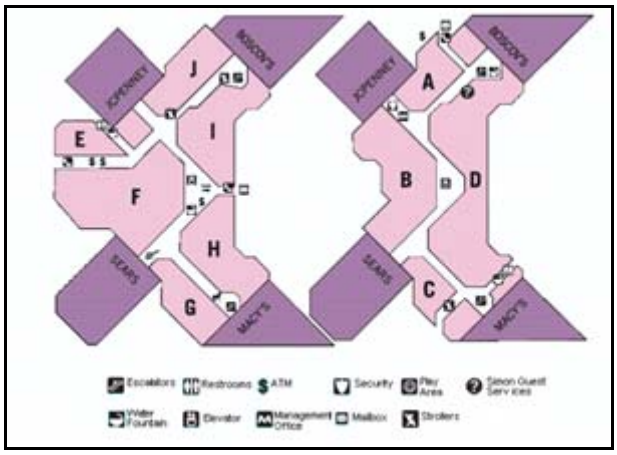


Table A3-8: Store Directory for TC4

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