



CHAPTER 6

HOUSEHOLD SOCIO-ECONOMIC & TRAVEL CHARACTERISTICS

6.1 Survey Framework

6.1.1 Introduction

Planning, development and operation of city transport system needs an appreciation of the travel characteristics of the people of the city. While traffic surveys provide information about movement of vehicles on road and their related problems and issues, special survey is necessary to elicit the socio-economic and travel characteristics of the people of the city for whom the transport system is being developed. Household Interview Survey (HIS) provides this information by conduct of an interview of the members of a household, on a sample basis, at their home, with the help of a structured questionnaire.

6.1.2 Sample

A total of 4252 households were covered under HIS. The households were selected, on random sampling basis, from the electoral list, from each ward (TAZ).

6.1.3 HIS Objectives

Amongst the above surveys, Household Interview Surveys (HIS) is one of the most important.

The objectives of HIS were to

- Appreciate the characteristics of the households in Vijayawada, by ward, in terms of household size, vehicle ownership, income and expenditure pattern
- Appreciate the personal characteristics of each member of the household in terms of relationship to the head of household, age, sex, education, occupation, employment, place of work by ward, monthly income, driving license and average expenditure on travel
- Appreciate the trip characteristics of each member of the household in terms of number of trips made on an average working day, the origin and destination of the trips, mode(s) used, and trip length
- Elicit the opinion of the head of the household about the service produced by the public mass transport modes, his (her) suggestions for improving and reason for choosing a particular mode of public transport
- Establish correlation between socio-economic characteristics of a trip maker and his trip characteristics. This would be carried out on a disaggregated basis of gender, age and income correlating with trip purpose, mode, trip length etc.
- Generate necessary input data for calibrating travel demand model
- Derive value of time of the trip maker



- Elicit the preference to and perception of the trip maker about the public mass transport system and his willingness to pay for improved levels of service.
- Establish trip generation rates by Traffic Zones

6.1.4 HIS Questionnaire

A specially designed questionnaire was adopted for the HIS (Refer Annexure 4.2).

6.1.5 HIS Canvassing

The HIS was conducted by trained enumerators by visit to the household and interview of the head of the household and other members. Apart from the socio-economic characteristics of the respondents, information on trips made by them on the previous working day was enquired into and recorded. Repeat visits were made where necessary.

6.1.6 Selection and Training of Enumerators

About 50 enumerators with good educational background and experience in field surveys and knowledge of both Telugu and English, were selected. They were given intensive training in the conduct of the interviews and filling of the questionnaire. The importance of the HIS was explained and the significance of each of the questions explained. A set of sample questions to ask was also framed and the enumerators were trained. They were given advice as to how to approach the household head, explain the importance of the proposed survey to the people of the city and request household head and other members to spare time to answer the questions and cooperate. Each enumerator carried a letter of introduction. The selection and training of the enumerators and the conduct of the survey were carried out under the leadership, supervision and direction of a qualified and experienced Transport Planner. The program included conduct of pilot survey by each enumerator, critical evaluation of the data/information collected, identification of logical and other forms of errors and retraining.

6.1.7 Supervisions

The HIS was carried under the direct supervision of a Transport Planner assisted by Supervisors. The filled in survey proforma, on receipt from enumerators, were checked, on a sample basis, for missing entries and logical errors.

6.1.8 Opinion Survey

In addition to the socio-economic and trip characteristics, the head of the household was requested to respond to an Opinion Survey. The objectives were to elicit the perception of the residents of the city regarding the quality of the public transport system and their suggestions for improving the public transport system components.



6.1.9 Coding and Data Entry

The HIS data was coded and entered on Excel Format.

6.1.10 Survey Period

HIS was carried during the period July to August, 2006

6.1.11 Analysis

Detailed analysis of HIS data has been carried out. The household socio-economic, personal and trip characteristics have been analysed in detail and are presented in the following paras.

6.2 Household and Person Characteristics

The socio-economic characteristics of the people of Vijayawada City, by their spatial distribution have been analysed to discuss their impact on their travel behaviour and pattern. The following sections present the socio-economic characteristics of the people by Planning Sectors (PS).

6.2.1 Household Size

The average household size at city level is observed to be 4.31. It ranges between 4.2 (Auto Nagar) and 4.52 (Vijayawada Railway Junction). By TAZs the range is between 2.81 (TAZ 59) and 5.52 (TAZ 57).

Table 6.1 present and **Figure 6.1** depicts the household size by PS.

Table 6.1: Household Size by Planning Sectors

No	Sector	Household Size
1	West Vijayawada	4.37
2	K R Market	4.23
3	Chittinagar	4.38
4	Gandhi Nagar	4.33
5	Vijayawada Railway Junction	4.52
6	North Vijayawada	4.25
7	Gunadala	4.52
8	Auto Nagar	4.20
9	Patamata	4.17
10	CBD	4.23
11	Krishna Lanka	4.29
Vijayawada City		4.31

Source: CES VHIS, 2006

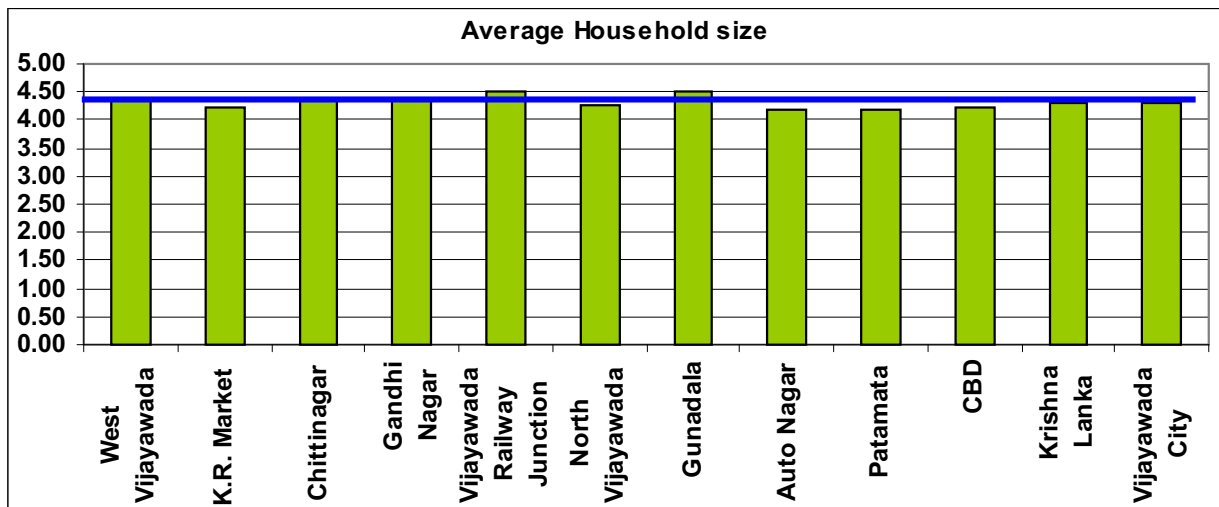


Figure 6.1: Average Household Size by Planning Sector

6.2.2 Gender

Vijayawada has a reasonably favorable share of females, the ratio being 968 (India 933); Andhra Pradesh 978). The ratio ranges between 963 (Patamata and CBD) to 977 (Vijayawada Railway Junction). **Table 6.2** presents the sex ratio by PS.

Table 6.2: Sex Ratio (F/M) by Planning Sectors

No.	Sector	Sex Ratio
1	West Vijayawada	956
2	K R Market	967
3	Chittinagar	960
4	Gandhi Nagar	973
5	Vijayawada Railway Junction	977
6	North Vijayawada	968
7	Gunadala	972
8	Auto Nagar	975
9	Patamata	963
10	CBD	963
11	Krishna Lanka	974
	Vijayawada City	968

Source: CES VHIS, 2006

6.2.3 Age Group

Vijayawada is a city of young people. Nearly 50% are below 25 years of age. Presently 4.29% of the people are above 60 years. However, there is a potential of increase of old age people in the coming decades. The high share of young and middle age groups indicate the high demand for educational and work opportunities. **Table 6.3** presents the



distribution of population, in percentage, by age groups by PS. **Figure 6.2** depicts the age sex pyramids by PS.

Table 6.3: Population Distribution by Age Group

(%)

Sector	Age Group (years)					Total
	0--6	7--16	17--24	25--59	Above 60	
West Vijayawada	8.41	20.75	20.03	47.60	3.21	100
K R Market	12.08	18.08	23.92	41.42	4.50	100
Chittinagar	7.65	16.78	24.19	46.73	4.65	100
Gandhi Nagar	9.58	19.04	21.29	45.39	4.70	100
Vijayawada Railway Junction	7.03	18.42	24.89	46.55	3.09	100
North Vijayawada	9.18	16.64	25.11	46.16	2.91	100
Gunadala	8.72	16.24	25.97	43.52	5.55	100
Auto Nagar	6.37	18.06	23.90	45.95	5.71	100
Patamata	6.47	17.59	22.30	48.12	5.53	100
CBD	8.45	15.29	24.08	47.89	4.29	100
Krishna Lanka	8.42	18.06	22.25	47.51	3.75	100
Vijayawada City	8.43	17.55	23.56	46.17	4.29	100

Source: CES VHIS, 2006

6.2.4 Literacy

Vijayawada is a highly literate city (88.5%) (India 65%;Andhra Pradesh 61%). However the share of illiterates at 11.5% calls for a major thrust in literacy programme. The level of education is also good with a high proportion of graduates and above (29%). **Table 6.4** presents the distribution of population by education. **Figure 6.3** presents the education levels by PS.

Table 6.4: Population Distribution by Education

(%)

Sector	Education Level						Total
	Illiterate	Primary	Middle/ Intermediate	Graduate	Post Graduate & above	Professional	
West Vijayawada	3.76	19.42	51.18	15.22	10.06	0.35	100
K R Market	14.41	12.80	43.51	26.16	3.03	0.09	100
Chittinagar	9.35	14.30	48.29	20.45	7.04	0.58	100
Gandhi Nagar	12.55	18.96	38.26	22.27	2.97	4.99	100
Vijayawada Railway Junction	9.08	14.75	45.46	22.47	2.19	6.05	100
North Vijayawada	9.23	19.34	45.68	19.53	4.32	1.90	100
Gunadala	15.91	12.43	49.56	19.34	2.54	0.22	100
Auto Nagar	11.21	11.35	42.55	30.35	3.97	0.57	100
Patamata	8.87	9.20	45.74	29.15	5.84	1.21	100
CBD	8.57	8.28	44.91	32.09	4.40	1.76	100
Krishna Lanka	20.20	9.96	44.21	22.15	3.05	0.43	100
Vijayawada City	11.57	13.81	45.64	22.89	4.48	1.61	100

Source: CES VHIS, 2006

Note: Excluding 0-6 years population







6.2.5 Occupation

Students (32.0%) and Housewife (Home makers) (28%) account for a major share of the population. Share of 'Business' occupation is low (8.3%). **Table 6.5** presents and **Figure 6.4** depicts the distribution of population by occupation, by PS.

Table 6.5: Distribution of Population by Occupation

Sector	Service	Business	Daily wages	Housewife	Student	Retired	Un Employed	Total
West Vijayawada	9.9	11.5	16.1	28.8	30.9	1.6	1.2	100
K R Market	22.2	15.1	12.1	28.3	20.0	2.0	0.3	100
Chittinagar	14.8	7.4	20.1	27.8	27.9	0.2	1.6	100
Gandhi Nagar	12.8	11.3	16.3	29.4	28.9	1.3	0.0	100
Vijayawada Railway Junction	5.8	9.6	15.9	23.3	44.9	0.5	0.0	100
North Vijayawada	9.7	9.0	20.6	28.3	31.0	1.2	0.2	100
Gunadala	6.3	3.1	18.0	27.9	44.1	0.3	0.3	100
Auto Nagar	23.0	6.7	7.8	26.7	34.5	1.4	0.0	100
Patamata	17.2	10.2	9.4	27.1	34.6	1.5	0.0	100
CBD	24.0	3.2	13.1	29.9	29.9	0.0	0.0	100
Krishna Lanka	23.3	7.8	12.6	29.5	26.5	0.3	0.0	100
Vijayawada City	14.9	8.3	15.5	28.0	32.0	0.8	0.4	100

Source: CES VHIS, 2006

Note: Excludes 0-6 years population

6.2.6 Household Income

The average monthly household income was observed to be Rs. 5347. The range amongst Planning Sectors is wide. K R Market (PS 2) has the lowest (Rs. 4594) and Patamata (PS 9) has the highest (Rs. 7264) household incomes. **Table 6.6** presents and **Figure 6.5** depicts the monthly average household income by PS.

Table 6.6: Monthly Average Household Income

Sector	Average Monthly Household Income (Rs)
West Vijayawada	4798
K R Market	4594
Chittinagar	5147
Gandhi Nagar	5070
Vijayawada Railway Junction	5601
North Vijayawada	5170
Gunadala	4687
Auto Nagar	7008
Patamata	7264
CBD	6016
Krishna Lanka	4654
Vijayawada City	5347

Source: CES VHIS, 2006



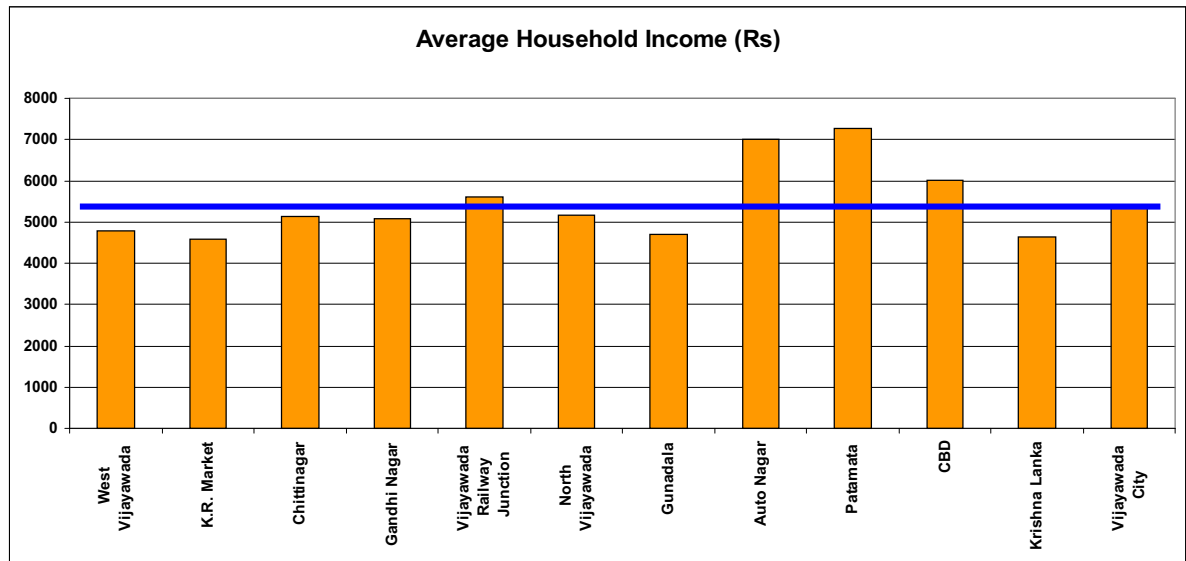


Figure 6.5: Monthly Average Household Income by Planning Sector

6.2.7 Income Groups

For assessing distribution of households by income groups, the following categorization, based on HUDCO practice, has been adopted:

Category		Monthly Household Income (Rs.)
Economically Weaker Sectors (EWS)	:	Upto 2500
Low Income Group (LIG)	:	2501-5500
Middle Income Group (MIG)	:	5501-10000
High Income Group (HIG)	:	Above 10000

There is a preponderance of households in the LIG (57.71) category. Planning Sectors 8 (Auto Nagar) 9 (Patamata) and 10 (CBD) show a high proportion of HIG households. Concerted efforts are necessary to improve the levels of income of the people of the city. This is also a major factor for consideration in planning the transport system and provision of transport service within the city. **Table 6.7** presents and **Figure 6.6** depicts the distribution of households by identified income groups.





Table 6.7: Distribution of Household by Monthly Average Household Income by PS (%)

Sector	Upto 2500	2501-5500	5501-10000	Above 10000	All
West Vijayawada	8.74	66.43	22.03	2.80	100
K R Market	11.62	62.32	25.00	1.06	100
Chittinagar	12.05	57.91	26.08	3.96	100
Gandhi Nagar	8.75	64.46	23.87	2.92	100
Vijayawada Railway Junction	2.52	59.62	33.12	4.73	100
North Vijayawada	11.71	59.85	24.54	3.90	100
Gunadala	16.82	57.95	22.27	2.95	100
Auto Nagar	9.66	43.75	31.82	14.77	100
Patamata	3.92	48.56	32.90	14.62	100
CBD	7.32	56.34	28.17	8.17	100
Krishna Lanka	20.56	54.26	21.48	3.70	100
Vijayawada City	11.10	57.71	25.92	5.27	100

Source: CES VHIS, 2006

6.2.8 Household Size by Income Group

Household size increases by increase in income level. At city level while the EWS category has an average household size of 4.03, the HIG category has a size of 4.54. **Table 6.8** presents the variation of household size by income category, by PS.

Table 6.8: Household Size by Income Category

Sector	Upto2500	2501-5500	5501-10000	Above 10000	All
West Vijayawada	4.24	4.28	4.38	6.63	4.36
K R Market	3.97	4.17	4.51	3.67	4.23
Chittinagar	4.07	4.39	4.41	4.68	4.37
Gandhi Nagar	4.15	4.31	4.39	4.55	4.32
Vijayawada Railway Junction	4.13	4.36	4.76	4.93	4.51
North Vijayawada	3.62	4.14	4.53	5.10	4.21
Gunadala	4.00	4.53	4.85	4.46	4.51
Auto Nagar	4.06	4.19	4.29	4.12	4.20
Patamata	4.00	4.01	4.21	4.55	4.16
CBD	3.81	4.22	4.38	4.28	4.24
Krishna Lanka	4.23	4.14	4.59	3.80	4.24
Vijayawada City	4.03	4.26	4.49	4.54	4.31

Source: CES VHIS, 2006

6.2.9 Household Expenditure Pattern

'Food' (36.9%) and Housing (13.82%) account for a major share of the household monthly expenditure. Expenditure on 'transport' is reasonably high at 12.74%. It is a maximum of 13.81% in Planning Sector 8 (Auto Nagar) and 10 (CBD). There is a need to



develop and operate economical transport services to promote mobility of the people. **Table 6.9** presents the household monthly expenditure pattern by Planning Sectors.

Table 6.9: Household Monthly Expenditure Pattern by Planning Sectors (%)

Sector	Food	Housing (Rent)	Education	Transport	Health	Others	All
West Vijayawada	36.57	14.42	10.10	13.65	7.01	18.25	100
K R Market	30.77	15.77	7.86	13.61	7.09	24.91	100
Chittinagar	36.78	15.12	9.54	11.62	10.06	16.88	100
Gandhi Nagar	40.61	14.62	10.55	12.91	8.87	12.45	100
Vijayawada Railway Junction	40.31	17.42	10.33	11.45	7.32	13.15	100
North Vijayawada	33.52	13.21	13.02	10.71	11.32	18.21	100
Gunadala	41.81	10.21	7.58	12.82	11.35	16.23	100
Auto Nagar	40.29	10.87	13.09	13.81	8.88	13.07	100
Patamata	35.71	13.54	15.42	13.00	9.61	12.73	100
CBD	31.92	13.20	11.95	13.78	9.41	19.74	100
Krishna Lanka	38.11	13.93	10.88	12.72	8.09	16.27	100
Vijayawada City	36.90	13.82	11.15	12.74	9.03	16.37	100

Source: CES VHIS, 2006

6.2.10 Household Income and Expenditure

The household monthly expenditure is less than income by 20.49% at city level. By PS the difference ranges between 12.31% (K R Market) (PS -2) and 27.61% (Patamata (PS-9). This covers other expenditure during the year and hence household would be less than 20.49%. **Table 6.10** presents the household monthly income and expenditure pattern.

Table 6.10: Household Monthly Income and Expenditure Pattern

Sector	Average Monthly Household Income (Rs)	Average Monthly Household Expenditure (Rs)	Saving (Rs)	Expenditure (% of Income)	Saving (% of Income)
West Vijayawada	4798	3736	1062	77.87	22.13
K R Market	4594	4029	565	87.69	12.31
Chittinagar	5147	4311	836	83.76	16.24
Gandhi Nagar	5070	4077	993	80.41	19.59
Vijayawada Railway Junction	5601	4416	1185	78.85	21.15
North Vijayawada	5170	4404	765	85.20	14.80
Gunadala	4687	3627	1061	77.37	22.63
Auto Nagar	7008	5096	1912	72.71	27.29
Patamata	7264	5258	2006	72.39	27.61
CBD	6016	4513	1503	75.02	24.98
Krishna Lanka	4654	3797	857	81.58	18.42
Vijayawada City	5347	4251	1096	79.51	20.49

Source: CES VHIS, 2006



6.3 Travel Characteristics

6.3.1 Trip Generation

A total of 12,61,026 person trips were generated on an average working day (2006), in Vijayawada city.

6.3.2 Per Capita Trip Rate

The overall mobility rate i.e. the Per Capita Trip Rate (PCTR), at the city level, including persons in all age groups, works out to 1.36 including 'walk' trips and 1.02 excluding 'walk' trips. The overall and vehicular mobility rates are moderate to high. With increase in income levels mobility would increase resulting in higher levels of travel demand.

Excluding population in the age group 0 -6 years, the PCTR works out to 1.49 including and 1.11 excluding 'walk' trips.

Amongst Planning Sectors, North Vijayawada (PS-6) exhibits PCTR of 1.29 considering only vehicular trips. K R Market (PS-2) exhibits the lowest at 0.72. **Table 6.11** presents the person trips and PCTR by Planning Sectors.

Table 6.11: Person Trips & Per Capita Trip Rates by Planning Sectors

Sector	Share of Person Trips Generated (%)	Per Capita Trip Rate			
		With Walk	Without Walk	With Walk*	Without Walk*
West Vijayawada	6.59	1.23	0.75	1.34	0.82
K R Market	6.03	1.14	0.72	1.29	0.82
Chittinagar	14.16	1.36	0.93	1.47	1.01
Gandhi Nagar	9.17	1.30	1.11	1.43	1.23
Vijayawada Railway Junction	8.71	1.47	1.17	1.58	1.25
North Vijayawada	14.70	1.53	1.29	1.68	1.42
Gunadala	9.60	1.29	0.93	1.41	1.01
Auto Nagar	3.52	1.44	1.13	1.54	1.21
Patamata	9.31	1.51	1.27	1.62	1.36
CBD	8.33	1.41	0.99	1.54	1.08
Krishna Lanka	9.87	1.26	0.87	1.37	0.95
Vijayawada City	100.00	1.36	1.02	1.49	1.11

* Excluding 0--6 years Population

Source: CES VHIS, 2006



6.3.3 Mobility By Income Groups

Mobility rate varies with income as it determines the ability to pay for the trip. However at the highest income group level the PCTR may stabilize or even decline. The PCTR of EWS category is a low of 1.17 and of HIG 1.55. As a corollary this indicates that to increase income levels there is a need to improve mobility of the people. **Table 6.11** presents the PCTR (all trips) by income group by Planning Sectors.

Figure 6.7 and **6.8** show the relationship between mobility rate and income levels and vice versa.

Table 6.12: Mobility Rate (PCTR) by Income Group by Planning Sectors

Sector	Income Group (Rs per month)				
	Upto 2500	2501-5500	5501-10000	>10000	Total
West Vijayawada	1.28	1.24	1.20	1.14	1.23
K R Market	0.74	1.12	1.32	1.82	1.14
Chittinagar	1.20	1.29	1.53	1.51	1.35
Gandhi Nagar	1.17	1.26	1.39	1.65	1.30
Vijayawada Railway Junction	1.23	1.37	1.62	1.62	1.47
North Vijayawada	1.46	1.55	1.49	1.56	1.53
Gunadala	1.30	1.28	1.32	1.30	1.29
Auto Nagar	1.07	1.37	1.59	1.47	1.44
Patamata	0.88	1.46	1.60	1.64	1.51
CBD	1.23	1.37	1.47	1.66	1.41
Krishna Lanka	1.05	1.34	1.24	1.46	1.26
Vijayawada	1.17	1.33	1.45	1.55	1.36

Source: CES VHIS, 2006

6.3.4 Modal Share

'Walk' is the major mode of travel accounting for 25% of all the trips Standard Bus and 2 - Wheelers account for about 22% of trips each. Trips by 'cycles' is moderate at about 15% . Overall the modal share of public transport mode is only 22.68%. Auto Rickshaws share a good 12.66%. By Planning Sectors, West Vijayawada (PS -1) exhibits a high share of 'walk' trips (38.96%) and Gandhinagar (PS -4) exhibits a high share of public transport trips (37.03%). **Table 6.13** presents the modal shares by Planning Sectors.







Table 6.13: Modal Share of Trip by Planning Sectors

(%)

Sector	Walk	Cycle	Cycle Rickshaw	Scooter/Motor Cycle	Auto Rickshaw	Car/Van	Taxi/Jeep	Mini Bus	Standard Bus	Rail	All
West Vijayawada	38.96	12.50	1.95	19.22	8.96	0.13	0.20	0.39	17.69	0.00	100
K R Market	36.49	7.53	0.55	19.12	7.44	0.14	0.00	0.00	28.59	0.15	100
Chittinagar	31.41	13.91	1.69	15.10	12.33	0.79	0.13	0.00	24.59	0.05	100
Gandhi Nagar	14.13	10.95	1.55	21.02	13.82	1.12	0.10	0.19	37.03	0.10	100
Vijayawada Railway Junction	20.50	10.87	2.04	17.44	19.87	0.18	0.00	0.00	28.74	0.37	100
North Vijayawada	15.35	15.54	0.48	19.15	18.17	0.37	0.03	1.00	29.90	0.00	100
Gunadala	28.24	22.93	1.01	27.34	7.86	1.22	0.04	0.12	11.08	0.15	100
Auto Nagar	21.51	14.45	1.10	42.72	4.62	2.90	0.00	0.00	12.38	0.31	100
Patamata	15.75	15.99	4.02	30.40	14.42	4.52	0.05	0.14	14.61	0.09	100
CBD	29.98	14.57	0.55	27.31	9.09	1.41	0.04	0.44	16.52	0.09	100
Krishna Lanka	31.08	18.02	2.29	21.48	12.08	0.57	0.00	0.03	14.37	0.08	100
Vijayawada City	25.05	14.68	1.57	22.17	12.66	1.12	0.06	0.25	22.32	0.11	100

Source: CES VHIS, 2006

6.3.5 Trip Length

The overall trip length including walk trips, in Vijayawada is a moderate 4.21 km. This indicates that the city is still reasonably compact. Only about 3.7% of trip have a trip length of more than 10 km.

The average trip length of 'walk' trips is only 1.09 km. Length of car trips is 10.67 km. Trips by Standard Buses have an average trip length of 5.89 km. Trips of Auto Nagar (PS-8) and Patamata (PS-9) have comparatively longer lengths.

Table 6.14 presents trip length by modes by PS.

Table 6.14: Trip length by Mode

(Km)

Sector	Walk	Cycle	Cycle Rickshaw	Scooter/Motor Cycle	Auto Rickshaw	Car/Van	Taxi/Jeep	Mini Bus	Standard Bus	Rail	All
West Vijayawada	1.22	3.73	3.64	4.90	3.26	3.00	5.00	5.67	5.52	0.00	3.23
K R Market	1.23	3.01	3.50	5.07	3.12	0.50	0.00	0.00	4.30	380.00	3.62
Chittinagar	1.13	4.09	3.18	5.23	3.90	6.10	5.00	0.00	5.42	110.00	3.72
Gandhi Nagar	1.11	3.14	3.69	4.76	3.28	6.16	5.00	5.67	5.52	22.00	4.06
Vijayawada Railway Junction	1.16	2.30	2.07	4.16	2.72	2.75	0.00	0.00	4.85	23.83	3.36
North Vijayawada	0.95	3.82	4.88	6.10	4.11	7.33	0.50	3.20	6.24	0.00	4.69
Gunadala	1.09	3.77		5.32	4.00	10.39	5.00	5.00	6.10	130.00	4.02
Auto Nagar	1.17	4.90	2.88	6.62	5.08	11.33	0.00	0.00	7.57	62.50	5.50
Patamata	1.10	4.19	3.11	7.57	6.11	10.82	4.00		6.79	20.00	5.75
CBD	1.33	4.19	3.33	5.21	3.46	7.49		4.17	7.13		4.43
Krishna Lanka	1.11	3.42	3.54	4.91	4.28	5.04	0.00	6.00	11.08	55.00	3.64
Vijayawada City	1.09	3.78	3.02	5.71	3.95	10.67	4.88	4.18	5.89	108.07	4.21

Source: CES VHIS, 2006



Table 6.15 presents cumulative trip length frequency distribution by PS.

Table 6.15: Cumulative Trip length Frequency distribution

Sector	Trip Length (km)						
	0 - 1	1 - 3	3 - 5	5 - 7	7 - 10	10 - 16	>16
West Vijayawada	25.4	63.1	81.9	92.9	98.4	99.9	100.0
K R Market	27.2	59.2	85.6	95.1	97.2	99.5	100.0
Chittinagar	23.0	57.0	77.6	90.6	97.4	99.3	100.0
Gandhi Nagar	16.0	47.0	78.4	90.4	97.4	99.4	100.0
Vijayawada Railway Junction	25.9	63.4	83.2	90.2	98.4	99.0	100.0
North Vijayawada	16.0	40.4	66.5	84.3	96.8	99.5	100.0
Gunadala	29.1	55.1	78.1	89.1	95.9	99.0	100.0
Auto Nagar	22.9	43.6	64.3	77.2	91.7	96.6	100.0
Patamata	15.1	40.6	68.4	80.6	91.1	95.1	100.0
CBD	19.1	53.9	82.9	88.0	94.9	98.0	100.0
Krishna Lanka	24.1	56.1	83.9	92.8	98.1	99.4	100.0
Vijayawada City	21.6	52.2	77.1	88.5	96.4	98.7	100.0

Source: CES VHIS, 2006

Figure 6.9 depicts cumulative trip length frequency distribution by PS.

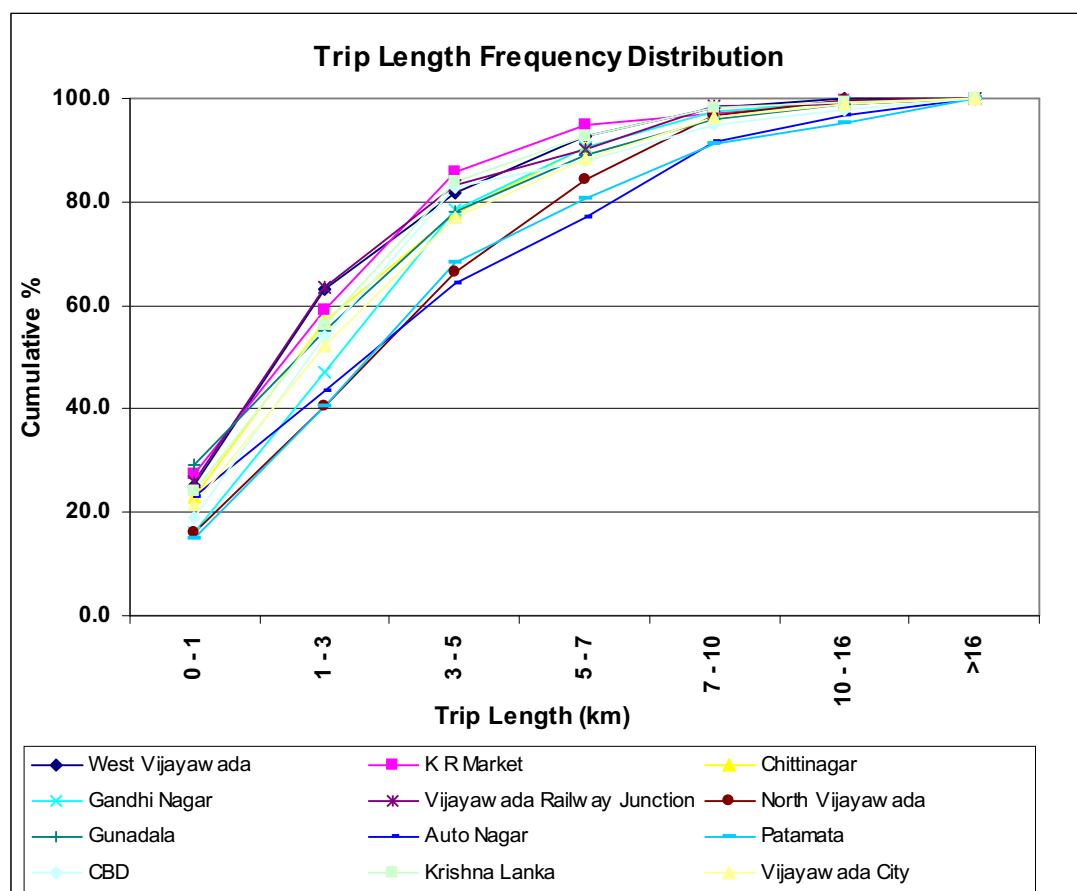


Figure 6.9: Cumulative Trip Length Frequency Distribution by Planning Sectors



6.3.6 Trip Purpose

'Return Home' purpose accounted for nearly half of the total trips produced. Redistributing Return Home trips, 'Work' and 'Education' purpose trips account for 70.64% of all trips. 'Work' trips range between a low of 33.28% (Patamata (PS -9)) and a high of 49.30% (CBD (PS-10)). Auto Nagar (PS – 8) generates comparatively high share of 'Business' trips (11.11%) 'Education' trips are high in all sectors, with West Vijayawada (PS-1) registering a high share of 37.18%. Share of 'Shopping' trips are high (14.41%). Share of Recreation, 'Religious' and 'Health' trips are low.

Table 6.16 presents the distribution of trips by purpose by Planning Sectors.

Table 6.16: Trip Distribution by Purpose

Sector	Work	Business	Education	Social	Shopping	Recreation/ Tourism	Religious	Health/ Hospital	Other Purpose	All
West Vijayawada	40.86	3.79	37.18	0.00	12.80	1.58	2.33	0.80	0.66	100
K R Market	36.24	9.09	28.97	0.29	17.94	1.31	2.76	2.81	0.60	100
Chittinagar	39.88	1.62	33.01	0.12	14.70	1.23	4.73	2.47	2.24	100
Gandhi Nagar	35.44	2.81	33.43	0.27	14.49	1.95	7.05	4.27	0.29	100
Vijayawada Railway Junction	33.63	3.33	31.76	0.49	17.78	1.64	5.26	2.41	3.69	100
North Vijayawada	38.33	1.79	29.14	0.82	20.13	2.35	3.80	2.89	0.74	100
Gunadala	47.97	7.10	25.44	3.17	5.54	6.29	0.53	3.31	0.65	100
Auto Nagar	45.29	11.11	28.98	4.69	3.33	4.10	1.18	1.00	0.31	100
Patamata	33.28	5.49	31.55	2.34	14.09	4.79	4.60	2.93	0.93	100
CBD	49.30	1.53	30.90	0.55	10.95	1.57	3.29	0.93	0.97	100
Krishna Lanka	39.04	4.73	31.13	0.68	17.11	1.27	4.48	1.06	0.50	100
Vijayawada City	39.60	4.02	31.04	1.02	14.41	2.47	3.89	2.41	1.14	100

* Return Home trips are distributed accordingly to all the remaining purposes

Source: CES VHIS, 2006

6.3.7 Gender Mobility

Overall the share of trips by males is 56.33% and that by females is 43.67%. By modes, females have a higher share of 'Walk' trips (54.78%) and a lower share of 'Rail' and 'Cycle' trips (7.99% and 26.67%). The share of 'Standard Bus' trips is almost equal by both the genders. However 'Females' have a high share of Auto -rickshaw trip (65.73%).

In terms of mobility, 'Females' have a lower mobility rate (1.21) as compared to 'Males' (1.51). Mobility rate by 'walk' of females is higher than of Males (0.38; 0.30).

'Females' have a low share of Work trips (20.48%) and Business trips (15.35%). Share of education trips is almost equal (46.75). On the other hand females have higher share of shopping (80.56%), recreation (60.43%) and religious (73.77%) trips.



Table 6.17 presents the share of trips by modes by gender. **Table 6.18** presents the mobility rates by modes by gender. **Table 6.19** presents the share of trips by purpose by gender.

Table 6.17: Share of Trips By Mode by Gender

(%)

Mode	Male	Female	Both
Walk	45.22	54.78	100
Cycle	73.33	26.67	100
Cycle Rickshaw	42.12	57.88	100
Scooter/Motor Cycle	77.98	22.02	100
Auto Rickshaw	34.27	65.73	100
Car/Van	60.70	39.30	100
Taxi/Jeep	43.84	56.16	100
Mini Bus	53.43	46.57	100
Standard Bus	49.33	50.67	100
Rail	92.01	7.99	100
All	56.33	43.67	100

Source: CES VHIS, 2006

Table 6.18: Mobility by Gender by Mode

Mode	Male	Female
Walk	0.30	0.38
Cycle	0.29	0.11
Cycle Rickshaw	0.02	0.03
Scooter/Motor Cycle	0.46	0.14
Auto Rickshaw	0.12	0.23
Car/Van	0.02	0.01
Taxi/Jeep	0.00	0.00
Mini Bus	0.00	0.00
Standard Bus	0.29	0.31
Rail	0.00	0.00
All	1.51	1.21

Source: CES VHIS, 2006

Table 6.19: Share of Trips By Purpose By Gender

(%)

Mode	Male	Female	Both
Work	79.52	20.48	100
Business	84.65	15.35	100
Education	53.25	46.75	100
Social	55.78	44.22	100
Shopping	19.44	80.56	100
Recreation/Tourism	39.57	60.43	100
Religious	26.23	73.77	100
Health/Hospital	45.60	54.40	100
Return Home	56.24	43.76	100
Other Purpose	41.15	58.85	100
All Trips	56.33	43.67	100

Source: CES VHIS, 2006



6.3.8 Trip Desire Pattern

Trips move from one place to another in fulfillment of their purpose. A complex movement pattern results at the city level. This needs to be addressed through provision of transport networks and systems appropriate in form and adequate in capacity. Appreciation of the desire pattern of trips enables this task. **Figure 6.10, 6.11, 6.12 and 6.13** presents the desire line diagram of walk trips, trips by private vehicles, trips by commercial vehicles (bus) and All trips.

Annexure 6.1 presents the O-D matrix of All Trips, Walk Trips, Trips by Private Vehicles and Trips by Commercial Vehicles (Bus).

Figure 6.14, 6.15 and 6.16 shows the Purpose-wise desire line pattern.

6.3.9 Self Containment

Integrated landuse-transport planning of a city endeavors to establish rational relationship between home and activity places and reduce trip lengths. This is reflected in the degree of self containment achieved i.e. the share of intra -sector trips of the total trips generated in the sector, in each spatial unit.

The degree of self containment of PSs in Vijayawada may be termed as poor. The range is between 18.65% (Auto Nagar (PS-8)) and 47.43% (Chittinagar (PS-3)). There is reasonably a higher degree of self containment of trips by 'Walk'. Trips by private vehicles and commercial vehicles exhibit a very low degree of self containment.

Table 6.20 presents the degree of self containment of the Planning Sectors.

Table 6.20: Self Containment

Sector	Self Containment (%)			
	Trips by Walk	Trips by Private Vehicles	Trips by Commercial Vehicles	All Trips
West Vijayawada	75.80	28.61	19.93	38.10
K R Market	64.61	19.62	14.55	24.46
Chittinagar	83.62	36.26	34.96	47.43
Gandhi Nagar	82.63	19.64	25.33	30.26
Vijayawada Railway Junction	89.27	38.54	29.23	43.28
North Vijayawada	90.80	41.20	27.04	44.03
Gunadala	75.85	25.90	23.03	35.40
Auto Nagar	42.57	17.67	12.52	18.65
Patamata	56.34	21.63	15.25	22.69
CBD	67.79	19.78	18.85	25.45
Krishna Lanka	81.66	30.12	29.13	42.22

Source: CES VHIS, 2006

















6.4 Travel Demand

The overall travel demand in Vijayawada city is 53,08,918 person/km. 'Walk' modes account for only 6.5%. 'Standard Buses' account for 31.2% and '2-wheelers' for 30.1% of the travel demand. Share of travel demand, by modes, is presented in **Table 6.21**.

Table 6.21: Share of Travel Demand by Modes

Sl. No.	Mode	Share (%)
1	Walk	6.5
2	Cycle	13.2
3	Cycle Rickshaws	1.1
4	2-wheelers	30.1
5	Auto Rickshaw	11.9
6	Car/Van	2.8
7	Taxi/Jeep	0.1
8	Mini Bus	0.3
9	Standard Bus	31.2
10	Rail	2.8
	Total	100.0

Source: CES VHIS, 2006

6.5 Opinion on Public Mass Transport

As part of the HIS, the heads of the households, were requested to give their opinion on the Public Mass Transport System of the city. The share by public mass transport modes is low in Vijayawada. Opinion on system modes, service, perceived importance of different service factors and suggestions for improvement were enquired into.

Opinion of Service

Reasons for Favourable Opinion

A large share (85.36%) of people noted 'Easy Availability' as the most important reason for favourable opinion about 'Autorickshaw' service. On the other hand 49.63% opened that it was not 'comfortable'. 47.76% opined that 'Bus' service was 'safe' but 32.83% opened that it was costly. A large number (47.47%) opined that Crew Behaviour of Buses was Bad. 'Cheap fare', 'Comfort' and 'safety' were factors in favour of Bus service. Interestingly 'Mini Bus' got a very high opinion for 'Good Crew Behaviour'.

Table 6.22 presents the favourable opinion about and **Table 6.23** presents the unfavourable opinion of the public transport modes.



Table 6.22: Favourable Opinion of Public Transport Modes

(%)

Mode	Easy Availability	Cheap Fare	Comforte	Safe	Good Area Coverage	Good Crew Behaviour	Total
Auto Rickshaw	85.36	0.88	4.27	2.67	6.10	0.72	100
Taxi	14.94	4.98	62.24	6.22	7.88	3.73	100
Mini Bus	1.53	0.89	1.43	0.87	0.74	94.54	100
Bus	5.87	21.24	16.72	47.76	4.24	4.17	100

Source: CES VHIS, 2006

Table 6.23: Unfavourable Opinion of Public Transport Modes

(%)

Mode	Non-availability	Costly	Not Comfortable	Unsafe	Poor Area Coverage	No effective control	Bad Crew Behaviour	Others	Total
Auto Rickshaw	1.53	10.37	49.63	3.64	29.07	3.36	3.74	0.19	100.00
Taxi	61.68	37.70	0.10	0.10	0.07	0.12	0.22	0.00	100.00
Mini Bus	96.11	2.99	0.90	0.00	0.00	0.00	0.00	0.00	100.00
Bus	1.01	32.83	3.03	2.02	12.12	1.52	47.47	0.00	100.00

Source: CES VHIS, 2006

Opinion on Service

A large number opined 'Bus' service as only 'satisfactory' (71%). On the other hand nearly 48% opined 'Autorickshaw' service as 'Good'. Very few opined the services as 'Very Good'.

Table 6.24 presents the opinion of service by different modes.

Table 6.24: Rating of Public Transport Service by Modes

(%)

Mode	Very Good	Good	Satisfactory	Poor	No Reply	Total
Auto Rickshaw	2.47	47.91	37.35	11.97	0.31	100.00
Taxi	0.21	3.29	3.50	10.14	82.86	100.00
Mini Bus	0.33	2.05	2.02	7.22	88.38	100.00
Bus	1.15	23.73	71.00	2.96	1.15	100.00

Source: CES VHIS, 2006

Rating of Factors

'Fare' and 'Availability' have been rated as the most important factors of service by the people. 'Service frequency' comes next and rated as moderately important. 'Spatial coverage' comes next in importance. **Table 6.25** presents the rating of factors of service.



Table 6.25: Rating of Factors of Public Transport Service

(%)

Factors	Very Important	Moderately Important	Not Important	Total
Fare	66.44	24.65	8.91	100.00
Travel Time	60.63	33.91	5.46	100.00
Riding Comfort	61.34	31.91	6.75	100.00
Service frequency	32.43	52.33	15.24	100.00
Availability	63.81	30.27	5.93	100.00
Spatial Coverage	28.15	48.31	23.54	100.00

Source: CES VHIS, 2006

Suggestions

'Increase of fleet', 'punctuality', 'comfort' and 'improved frequency' were important suggestions for improvement of 'Bus' service. 'Better Crew Behaviour' received the top priority amongst suggestions for improvement of Autorickshaw services. 'Better Quality of service' and 'Area of Coverage' were other important suggestions for autorickshaw service. 'Reduced fare' was the most important suggestion as regards 'Taxi' services. **Table 6.26** presents the suggestions by importance.

Table 6.26: Suggestions for Improvement for Service

(%)

Mode	Increase Fleet	Increase Area Coverage	Improve frequency in peak hour	Better Quality of Vehicles	Improve Punctuality	More Comfort	Better Crew Behaviour	Reduce fare	Total
Auto Rickshaw	4.6	13.9	2.5	26.1	2.7	5.3	42.4	2.4	100.0
Taxi	1.3	2.9	3.0	3.8	0.7	3.4	3.3	81.8	100.0
Mini Bus	42.5	14.7	1.5	15.7	3.0	6.8	9.8	5.9	100.0
Bus	26.7	7.5	15.5	11.7	17.6	17.5	1.3	2.2	100.0

Source: CES VHIS, 2006

6.6 Comparative Analysis

The socio-economic and trip characteristics of Vijayawada make interesting comparison with those of other cities of Thiruvananthapuram, Indore, Jamnagar, Rajkot, Visakhapatnam and Guwahati. The average household size is second lowest. Household monthly income (current prices) is also comparatively low as compared to Guwahati and Indore. Expenditure on 'transport' is more compared to Indore, Rajkot and Jamnagar. Mobility rate is high next nearly to Indore. Average trip length is moderate. Share of trips by public transport is comparatively low.

Table 6.27 presents the comparative picture.



Table 6.27: Vijayawada– Socio-Economic and Trip Characteristics Comparative Picture
(Km)

Study Area	Thiruvananthapuram	Indore	Jamnagar	Rajkot	Visakhapatnam	Guwahati	Vijayawada
Size (sqkm)	221.24	214.1	30.58	105	111.76	262	61.8
Population (lakh)	11.68	17.19	5.09	10.02	9.49	9.81	8.45
Sex Ratio	1001	-	-	903	945	915	968
Literacy Rate	98.5	-	80.0	94.70	80.0	97.2	88.5
Household Size	4.33	5.33	4.89	4.87	4.68	4.07	4.31
PCI (Rs/month)	1369	1411	-	-	778	2126	1241
Avg HH Income (Rs/month)	-	7524	4188	6029	3215	8651	5347
Food (%)	54.7	27.4	-	35.1	50.7	44.1	36.9
Transport (%)	14.5	8	7.75	8	13.7	16.5	12.74
PCTR (inc. walk)	1.01	1.49	0.83	1.29	1.14	0.94	1.36
PCTR (exc. walk)	0.66	1.09	0.5	0.92	0.68	0.77	1.02
ATL (inc. walk) (km)	6.4	3.8	5.3	6.9	3.57	5.8	4.21
ATL (exc. walk) (km)	7.8	4.4	7.7	7.1	5.06	6.89	5.25
ATL (km)							
Walk	2	1.2	1.45	1.09	1.4	1.16	1.09
2-w	6.1	5	3.34	3.93	4.5	5.65	5.71
Car	8.6	6.5	11.81	14.26	-	7.23	10.67
Cycle	-	3.2	-	3.1	2.8	2.76	3.78
Bus	8.9	6	-	13.5	5.8	8.46	5.89
Train	110	31.7	-	-	10.5	339.33	108.0
Modal Split							
Walk	35.4	26	38	28	41	18.2	25.05
Public	28.5	16.4	-	-	30	30.9	22.68
Private	40.2	51	24	38	21	37.2	40.07
Purpose							
Work	46	38	59	42	47	32.08	39.60
Education	28.8	37.8	31	15	38.3	15.01	31.04

Source:

1. Comprehensive Traffic and Transportation Study for Thiruvananthapuram Urban Area, Kerala, CES, 2002
2. Comprehensive Traffic and Transportation Study for Indore Urban Area, CES, 2002
3. Short Term Traffic and Transportation Improvement Plan for City of Jamnagar, Gujarat, CES, 2002
4. Short Term Traffic and Transportation Improvement Plan for City of Rajkot, Gujarat, CES, 2002
5. Revision of Master Plan for Vishakhapatnam Metropolitan Region, CES 2002
6. Preparation of Comprehensive Master Plan for Guwahati Metropolitan Area, CES 2003

6.7 General

Appreciation of socio-economic and travel characteristics of the people of Vijayawada provides a good base for rational planning, development, operation and management of the overall transport system of Vijayawada City.