

2.3.8 Social Increase of Population by Income Level and by Zone of Destination

The assessment of population behaviour to move home was also studied through HIS, by asking household their previous address, and how long ago they moved. The analysis reported below summarises the population which moved home within the last five or ten years, by low and high income groups. This is a preliminary analysis, with respect to population movement from outside or within the Study Area to the Study Area only. The analysis from where the population moved from will be subject of further analysis, at a later date.

The low income households (those earning \leq PKR 10,000 /month) who moved home within the last five or ten years to the Study Area Town/ Tehsil are summarised in Table 2.3.12. Close to one third of all low income households moved home to the Study Area over the last ten years, whereas, those who moved within the last five years is about one-fifth of all low income households. This amounts to about 4 % of total households of the Study Area. The area-wide distribution of households which moved to the Study Area is above 30 % for most areas of Lahore Towns and adjoining areas of Sheikhpura District. In case of Kasur District the low income household movement is close to half of all those who moved in the Study Area. This would illustrate that the tendency of low income household to move, is to the areas in concentric fashion around city centre, and as adjoining Tehsil areas of Pattoki and Kasur are farther away, the migration is much lower than the adjoining Tehsils of Sheikhpura District.

The low income households who moved over the last 5 or 10 years are also shown at zonal level in Figure 2.3.22 below. The five and ten year movement figures below, clearly depicts the low income household growth areas over the past five to ten years are mostly around (say within 10~20km radius) central Lahore, and very much limited to the outskirts, to the east and west/ south-west of Lahore.

By comparison, household with high income (Household's earning $>$ PKR 30,000 /month) have more tendency to move homes. Table 2.3.13 provides a summary of all high income households which moved home over the last five or ten years, with destination in the Study Area Towns or Tehsils. The favourite destination towns for high income group were urban area of Cantonment, and rather greener outskirts towns of Aziz Bhatti and Iqbal Towns in Lahore District. The adjoining areas of Kasur Tehsil also attracted more than 50 % of household, of high income households who moved, albeit the numbers are rather small and account for less than 0.3 % of total households of the Study Area. Overall 56 % of all high income households moved home over the last 10 year. This illustrates a considerable movement of households with changing economic and job environment.

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Table 2.3.12 LUTMP 2010 Low Income Household Who Moved Home over the Last 5 or 10 Years to the Study Area

District	Town / Tehsil	Low Income HH who moved within last 5 years		Low Income HH who moved within last 10 years		Total Low Income HH (000)
		HH (000)	% of Total Low Income HH	HH (000)	% of Total Low Income HH	
Lahore	Ravi Town	6.3	18	12.4	36	34.4
	Data Gunj Bakhsh	5.3	21	7.6	30	25.1
	Samanabad Town	5.0	25	7.5	38	20.0
	Shalamar Town	4.1	16	6.3	25	25.6
	Gulberg Town	2.1	20	3.5	33	10.6
	Aziz Bhatti Town	6.5	22	10.7	36	29.9
	Wagah Town	6.5	18	11.1	31	35.4
	Nishter Town	9.8	19	16.3	32	50.9
	Iqbal Town	7.8	20	13.0	33	39.1
	Cantonment	5.1	27	6.5	35	18.6
Sheikhupura	Ferozwala Tehsil	7.6	19	12.3	31	39.9
	Muridke Tehsil	3.7	20	6.0	33	18.4
	Sharaqpur Tehsil	1.5	19	1.9	24	7.9
Kasur	Kasur Tehsil	1.0	9	1.6	15	10.6
	Pattoki Tehsil	1.5	10	2.7	17	15.5
Lahore		58.5	20	94.9	33	289.6
Sheikhupura		12.8	20	20.2	31	65.6
Kasur		2.5	10	4.3	16	26.1
The Study Area Total		73.8	19	119.4	31	381.3

Source: JICA Study Team

The zonal distribution of low and high income group households who moved over the last five or ten years are shown in Figures 2.3.22 and 2.3.23 respectively, for both five and ten years. The majority of the movement of high income group households have been to DHA Lahore, Cantonment and areas along the Canal (various very high-end income gated communities) and also the areas of Raiwind. Some areas of DHA and along the Canal show that all the movement is over the last ten years and the entire household who moved are from high income group. Additionally, it can also be seen that during the period of five to ten years how the movement of high income household is static in some areas, particularly to the south-west direction.

Table 2.3.13 LUTMP 2010 High Income Household Who Moved Home over the Last 5 or 10 Years to the Study Area

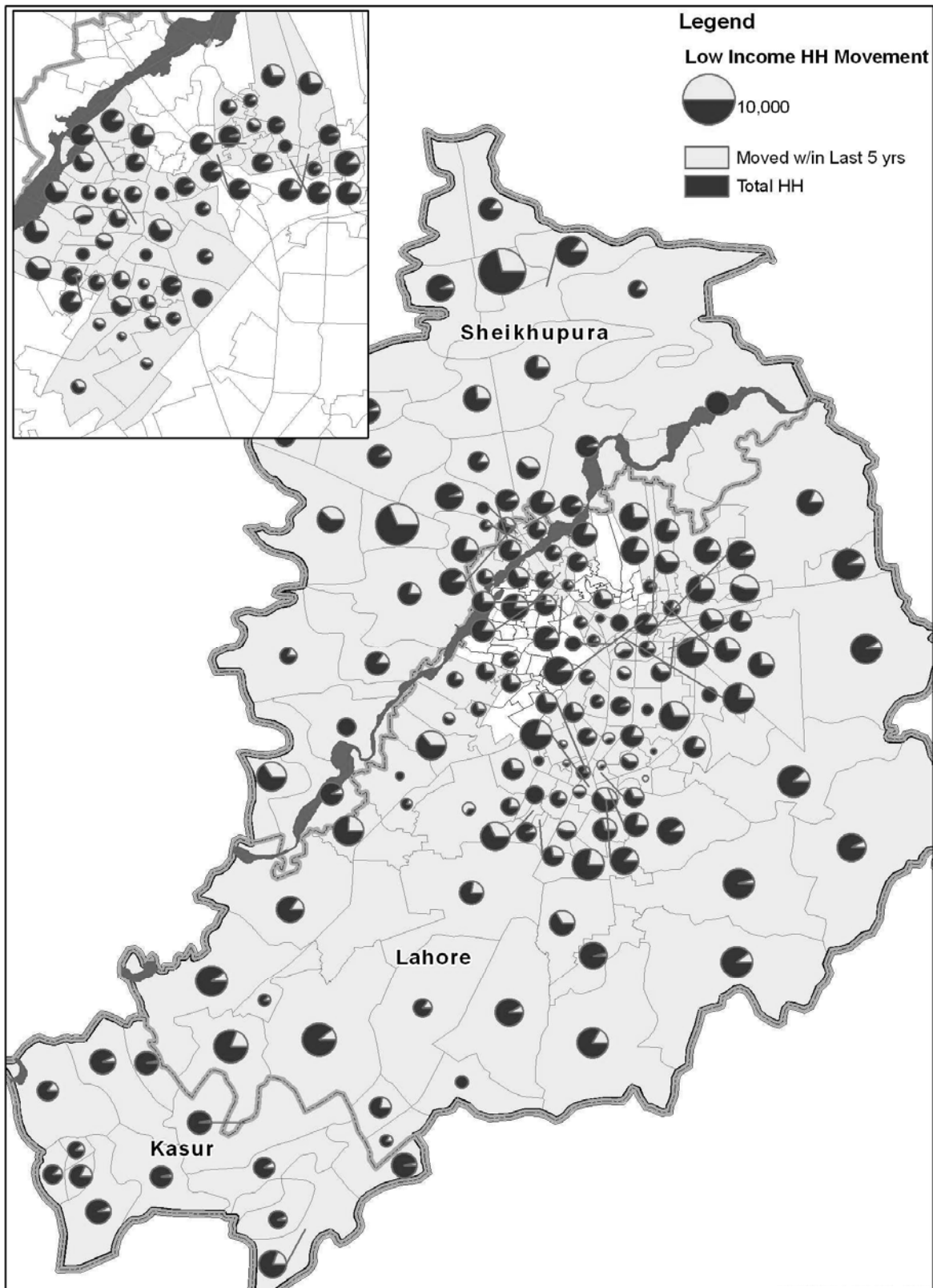
District	Town/ Tehsil	High Income HH who moved within last 5 years		High Income HH who moved within last 10 years		Total High Income HH (000)
		HH (000)	% of Total High Income HH	HH (000)	% of Total High Income HH	
Lahore	Ravi Town	3.5	11	6.9	22	31.8
	Data Gunj Bakhsh	5.2	12	8.4	20	43.0
	Samanabad Town	13.2	22	20.2	34	59.0
	Shalamar Town	4.2	13	8.4	27	31.3
	Gulberg Town	7.5	14	13.0	24	53.1
	Aziz Bhatti Town	6.6	29	11.5	51	22.6
	Wagah Town	2.3	18	3.7	30	12.5
	Nishter Town	3.8	18	6.7	31	21.5
	Iqbal Town	16.1	30	28.6	53	53.5
	Cantonment	23.1	33	36.1	51	70.8
Sheikhupura	Ferozwala Tehsil	1.2	12	1.7	17	10.3
	Muridke Tehsil	0.3	7	0.9	20	4.6
	Sharaqpur Tehsil	0.6	11	0.8	14	5.7
Kasur	Kasur Tehsil	4.3	57	5.0	67	7.5
	Pattoki Tehsil	0.3	9	0.5	15	3.3
Lahore		85.5	21	143.5	36	399.1
Sheikhupura		2.1	10	3.4	17	20.6
Kasur		4.6	43	5.5	51	10.8
The Study Area Total		92.2	21	152.4	35	430.5

Source: JICA Study Team

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Figure 2.3.22

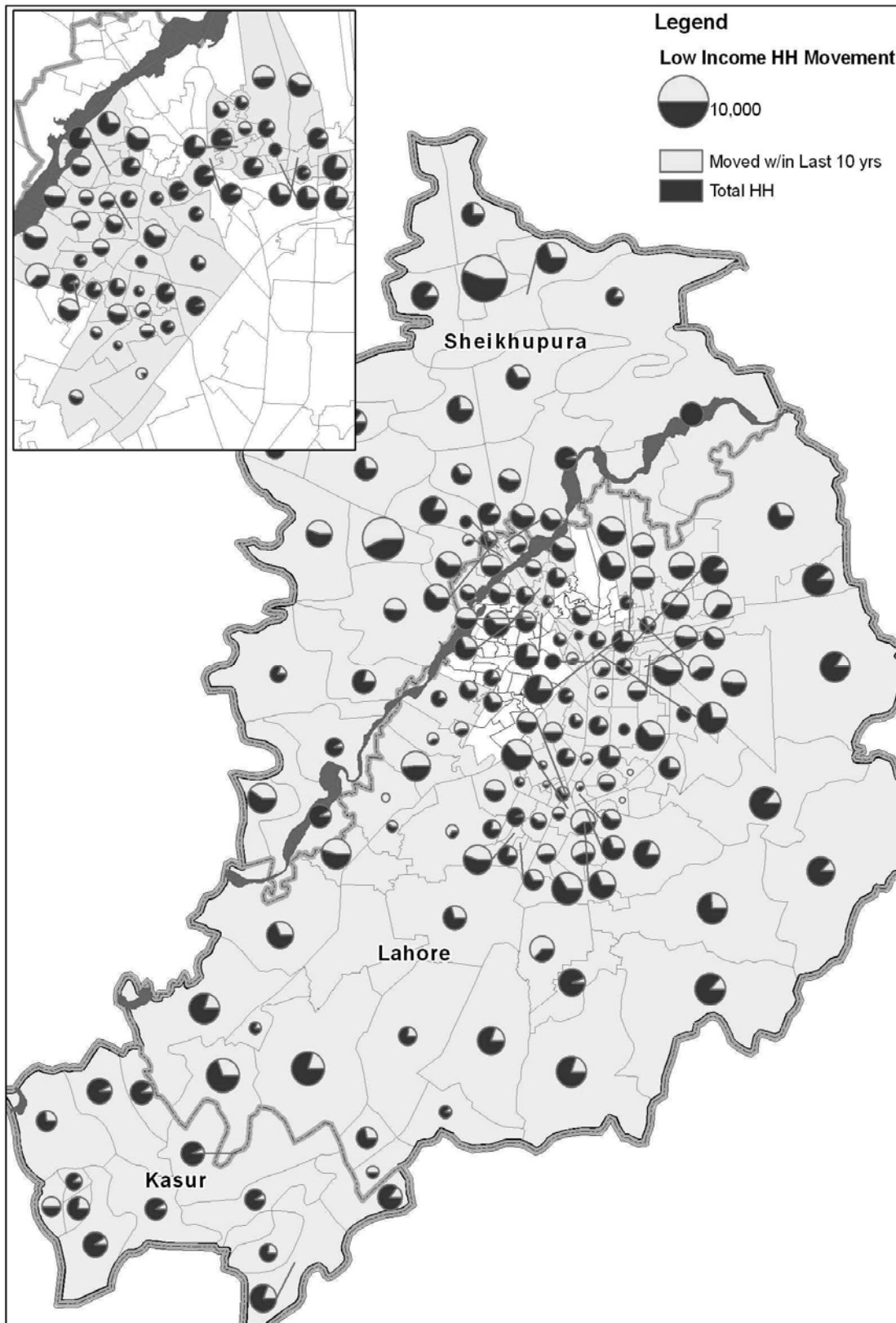
Low Income Household Movement by HIS Zone over the last 5 and 10 Years <5 years>



Source: JICA Study Team

Figure 2.3.22

Low Income Household Movement by HIS Zone over the last 5 and 10 years <10 Years>

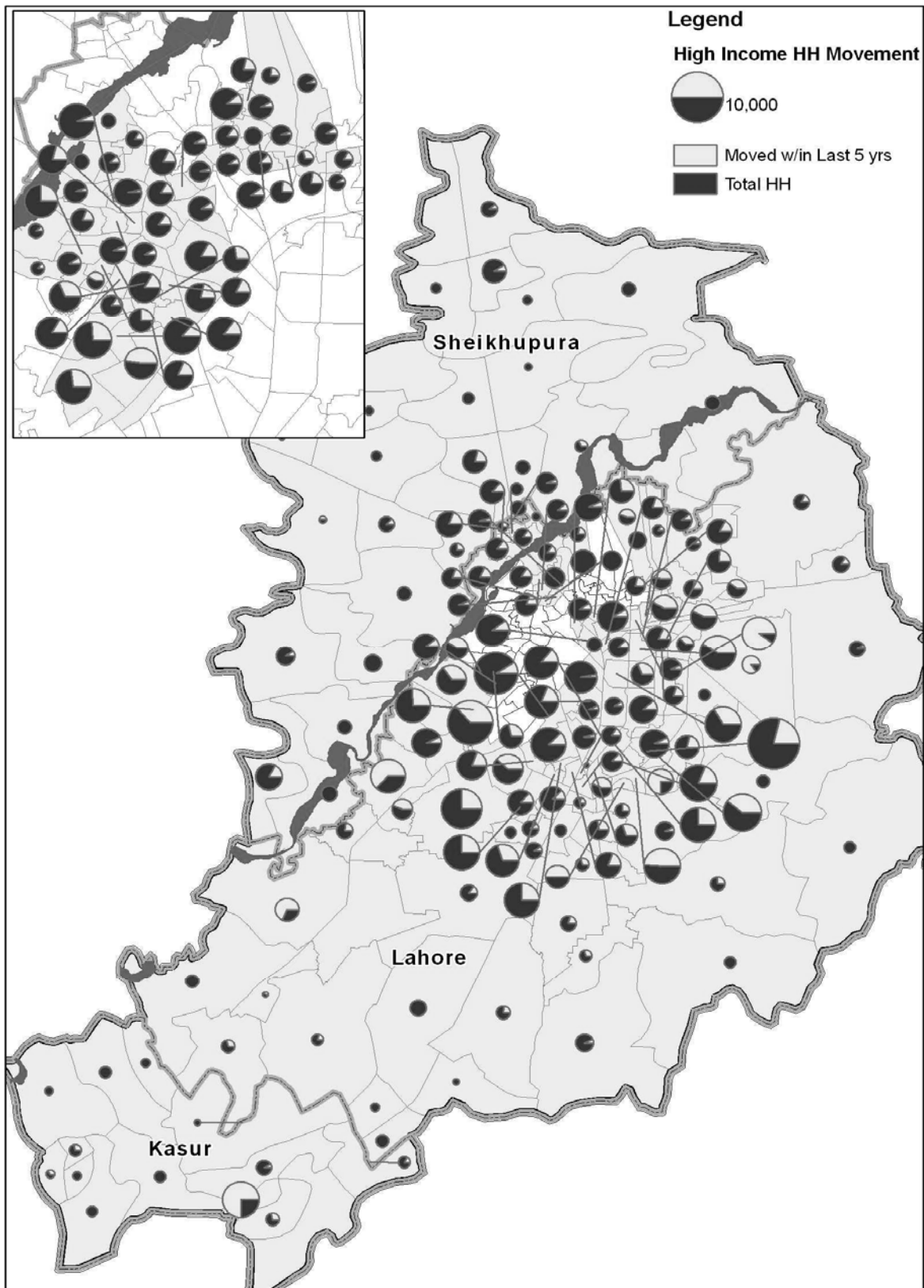


Source: JICA Study Team

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Figure 2.3.23

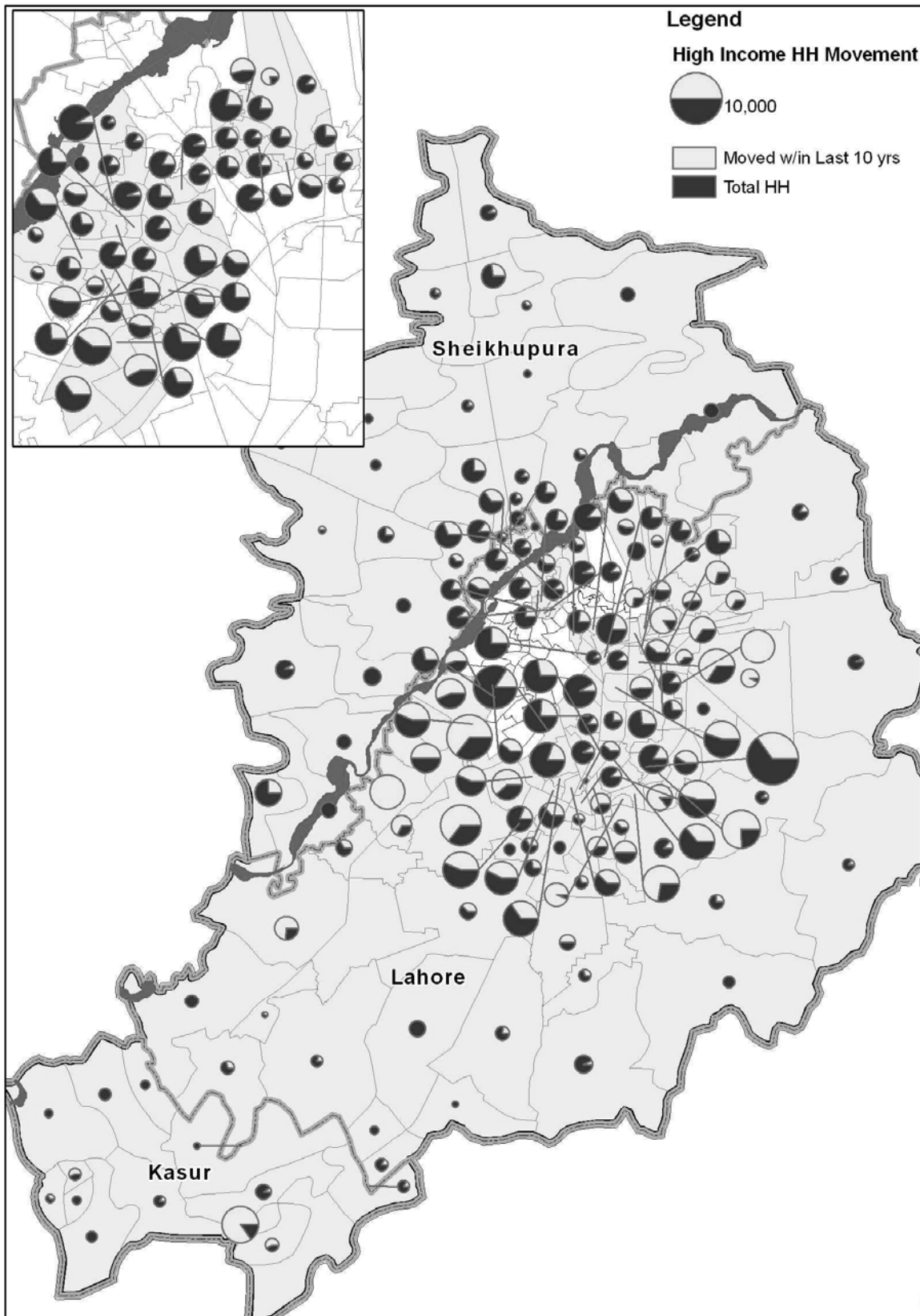
High Income Household Movement by HIS Zone over the last 5 and 10 years <5 years>



Source: JICA Study Team

Figure 2.3.23

High Income Household Movement by HIS Zone over the last 5 and 10 years <10 years>



Source: JICA Study Team

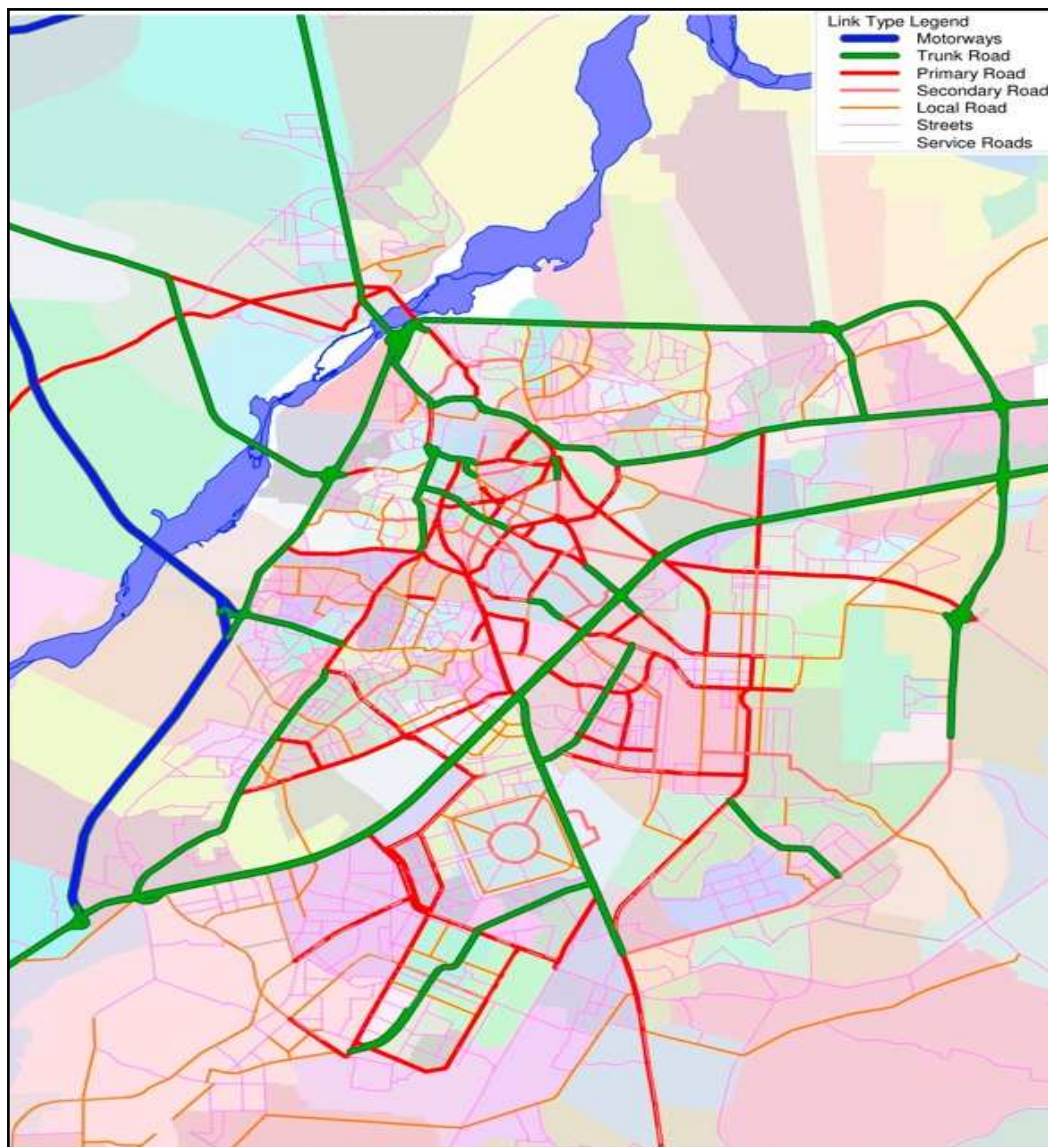
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2.4 Transport System of Lahore

2.4.1 Road Network

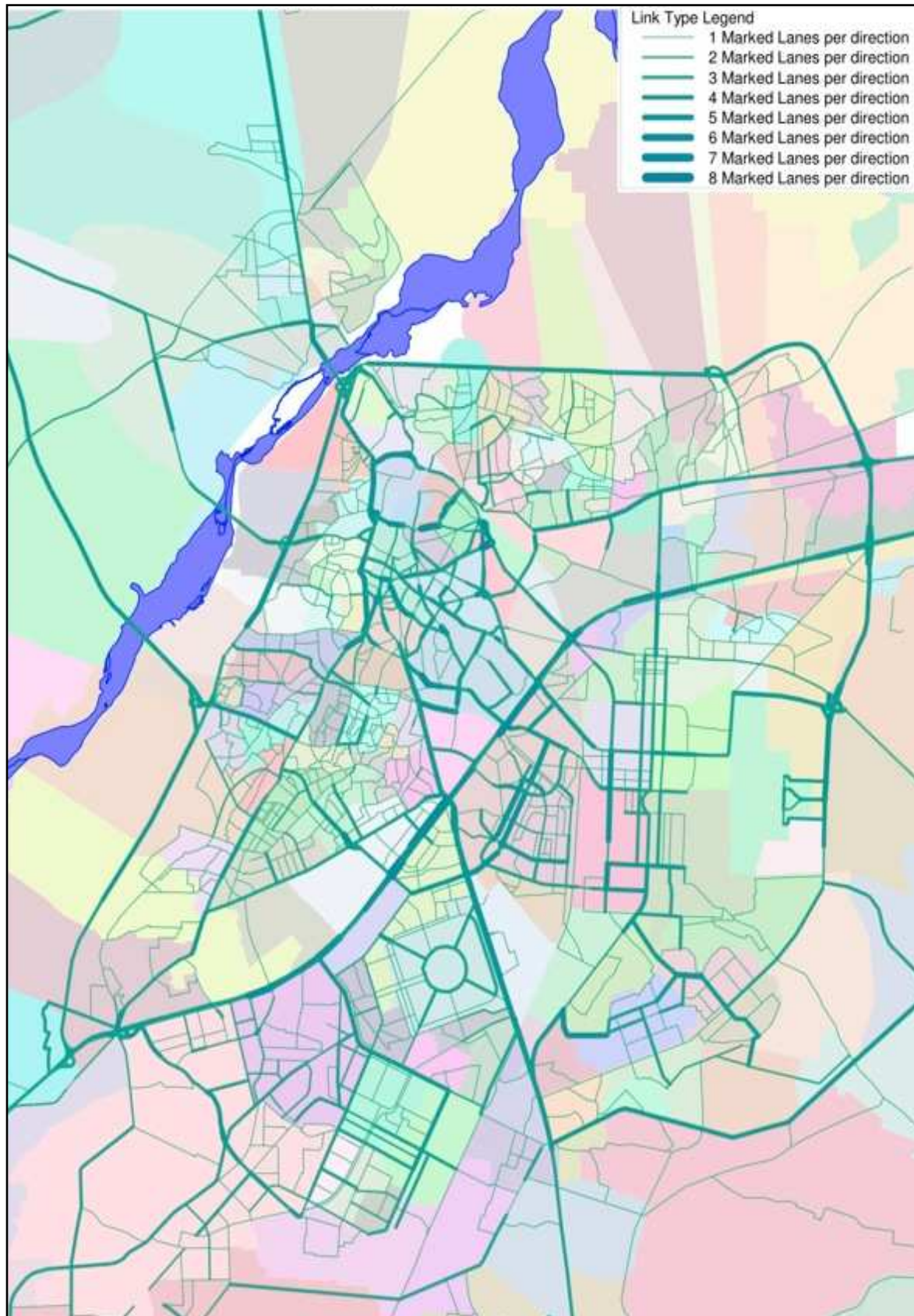
A Road Inventory Survey (RIS) was undertaken for this study and the results were used to build a complete picture of the Study Area road network. A highway network model was built and the results are shown in Figure 2.4.1, with the various road types classified by their function in the road hierarchy. Figure 2.4.2 presents the road network expressed in terms of number of lanes (by direction). The road network is relatively well developed in Lahore. At the same time, however, it is observed that road development did not take place evenly by area and a number of bottlenecks were observed.

Figure 2.4.1 Lahore Study Area Surveyed Road Network as Defined by Agencies



Source: Road Classification as By Different Agencies

Figure 2.4.2 Lahore Study Area Road Network by Number of Lanes



Source: JICA Study Team

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The RIS surveyed 64km of Motorways, about 430 km of Trunk and Primary Roads and other road lengths as specified in the table below.

Table 2.4.1 Surveyed Road Lengths from RIS

Road Class	Length Surveyed (km)
Motorway	64
Trunk Road	230
Primary Road	200
Secondary Road	55
Local Road	265
Streets and Rural Roads	1,447
Service Road	386
Total	2,647

Source: JICA Study Team

2.4.2 Road Transport

(1) Road Transport Modes in Lahore

In general, Lahore has better road infrastructure than other major cities of the Punjab. The roads are wide and several underpasses and flyovers have been constructed, except for the city center and “Walled City” areas. The central areas cause major traffic jams, resulting in longer travel time for all travellers in central areas of Lahore.

In addition to private vehicles such as motor cycles, cars and trucks, the public transport modes of Lahore include:

- Public buses, large and medium size
- Mini buses (Delivery Vans), Mini-vans called ‘Wagons’
- Auto Rickshaws, Qingqis (a motorcycle driven Rickshaw)
- Taxis, and
- Horse Drown carriages and hand pulled Carts

Many auto rickshaws are being changed from 2-stroke-cyle to 4-stroke-cyle engines and from petrol to Compressed Natural Gas (CNG) operation to reduce air and noise pollution in the city.

Figure 2.4.3 Traffic Congestion at Qartaba Chowk (Intersection) in the Central Lahore



Source: JICA Study Team

Figure 2.4.4 Motorcycle Rickshaw (Qingqi) at Fort Road



Source: JICA Study Team

Figure 2.4.5 Donkey Cart at an Intersection in Central Area



Source: JICA Study Team

(2) Bus Services

Several bus companies operate in Lahore. Premier Bus Services, owned by the Beacon House Group, was started in 2003. It provides premium transportation services to the general public of Lahore, with hundreds of buses running on exclusive routes. This is the largest public transport service provider in Lahore. The buses are in the process of being converted to CNG for environmental and economic reasons.

Daewoo City Buses provide intra-city and inter-city transport for the masses. Though these buses are fewer in number, they are air conditioned and provide better comfort to passengers. In addition to these two major companies, there are several other smaller companies (New Khan Metro, Niazi etc.) that provide services within Lahore. These cover only particular routes and are limited in number. The urban bus operation is regulated through LTC, setup by the GoPb.

Figure 2.4.6 Daewoo Intra-City Bus Terminal



Source: JICA Study Team

(3) Motorization

In 2008, 1.9 million motorized vehicles were registered in Lahore District. Lahore has witnessed a number of transport problems due to somewhat rapid motorization. In fact, motorization in Lahore is acute. The number of registered vehicles in Lahore District sharply increased by 294 % between 2001 and 2008, higher than the provincial motorization trend, i.e., 212 % during the same period. Among vehicle types, Lahore citizens nowadays show a strong preference for motorcycles, which increased at much faster rate, by 483 % during the same period and accounted for 136 units per 1,000 residents in 2008. This rapid growth is illustrated in Figures 2.4.7 and 2.4.8.

Table 2.4.2 below shows the number of registered vehicles with District Regional Transport Authority (DRTA), for all districts of Lahore division. Around 1,950,000 vehicles are registered within the Lahore district area, to be compared with only 34,000 and 52,000 for Kasur and Sheikhpura. Motorcycles make up for more than half (56 %) of all registered vehicles, while cars represent one third of registered vehicles in Lahore.

Due to such rapid rate of motorization, the number of motorized vehicles per 1,000 residents substantially increased from 95 vehicles in 2001 to 238 vehicles in 2008.

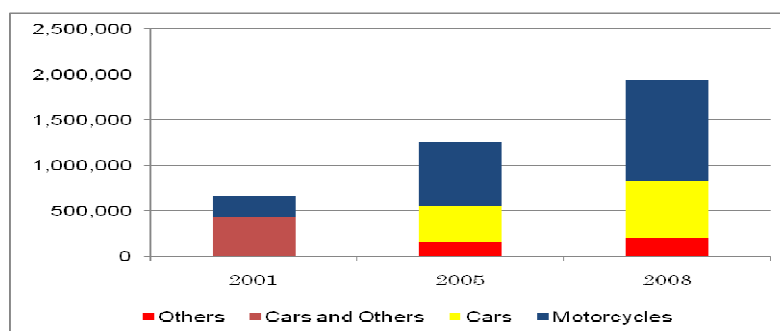
International experiences imply that such sharp trend may not continue for a long period. Compared with advanced Asian cities such as Tokyo and Seoul, vehicle ownership in Lahore has already reached the saturation range over 200 vehicles per 1,000 residents. However, Lahore differs from these cities in vehicle composition; motorcycles are dominant in Lahore with a 57 % share, while passenger cars are dominant in Tokyo and Seoul with a marginal role of two wheelers.

Table 2.4.2 Number of Motor Vehicles ('000) 'Registered' as of 30th June 2008

Registered Vehicle Type	Districts				Lahore Division Total
	Lahore	Kasur	Nankana Sahib*	Sheikhupura	
Cars, Jeeps and Wagons	638	0	0	4	642
Motorcycles	1,110	6	2	21	1,140
Trucks	16	0	0	1	17
Delivery Vans	40	0	0	0	41
Buses	33	0	0	1	34
Taxis	12	0	0	0	12
Auto-Rickshaws	66	1	0	2	70
Tractors	29	26	0	23	77
Others	1	0	0	0	2
Total	1,945	34	3	52	2,034

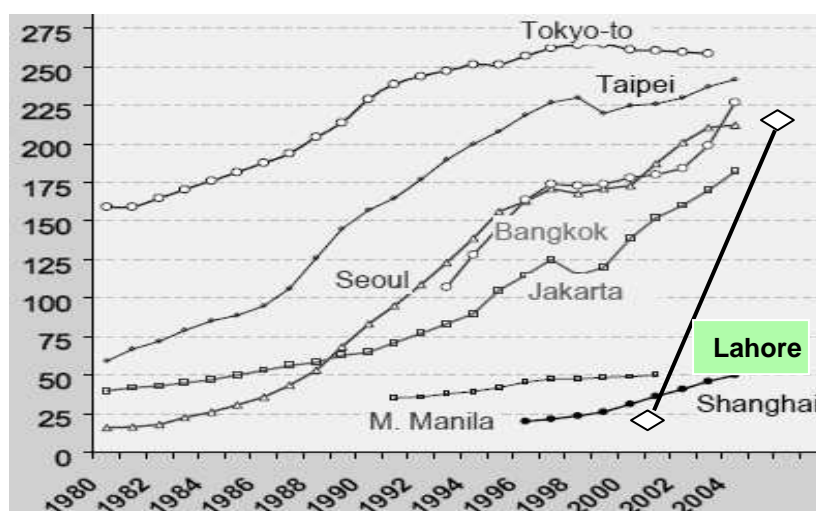
*Note: Nankana Sahib became a District in 2008
Source: Punjab Development Statistics, 2009

Figure 2.4.7 Trend in Registered Motorized Vehicles in Lahore District



Source: Punjab Development Statistics

Figure 2.4.8 Motorization Experiences in Selected Asian Cities



Note: Number of vehicles per 1,000 residents

Source: Sustainable Transport in East Asian Megacities (STREAM), 2007 except Lahore

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Two-wheeler patronage may shift to public transport usage with the provision of attractive public transport services and the imposition of stricter policies to two wheelers such as a local ban on riding two wheelers within Central Business Districts (CBDs), as China did this in late 1990s. On the other hand, a shift from two wheelers to private cars may happen only when considerable income increase occurs.

(4) Traffic Management

Road safety is declining as revealed by the increase in number of fatalities per year from 100 in 1990 to over 400 nowadays. Vulnerable road users are more exposed to traffic fatalities, including 30 % pedestrian, 10 % cyclist and 8 % motorcyclists due to inadequate walkways and cycle routes². Recent introduction of segregated highways within the city environment has lead to severe severance, without adequate provision for road crossing for residents, particularly in dense urban areas, resulting in such high pedestrian fatalities.

Table 2.4.3 Road Traffic Accidents and Casualties, Lahore

Year	Accidents			Casualties		
	Total	Fatal	Non-fatal	Total	Killed	Injured
2005	806	394	412	982	432	550
2007	759	443	316	1,003	455	548

Source: Punjab Development Statistics, 2007 and 2009

Intersections/ Junctions: There are four major types in Lahore city: grade separation, intersections with traffic signals, roundabouts and priority / uncontrolled junctions. Each type has pros and cons in terms of traffic management. Intersections with traffic signals can cope with heavy flows with small turning movements. In Lahore, however, traffic police is assigned at major intersections to ensure smooth traffic flows. It is reported that an area-wide traffic control system by means of synchronizing traffic signals and central signal control and management within a certain urban area has not been introduced yet.

Other Traffic Management Issues: They are restriction and rationalization of on-street parking, restricting roadside encroachment by vendors and allocating safe and comfortable pedestrian sidewalks and crossings. Those issues do not necessarily address to capital-intensive infrastructure development. Instead, institutional coordination among relevant government agencies and public involvement and awareness are keen to improve the situations for efficient and safe road space utilization.

ITS solutions: may become more attractive in the city. Possible options are Electronic Toll Collection (ETC) and vehicle On Board Unit (OBU) with wireless transaction or touch-less smartcard for ticketing to smooth traffic flow, car navigation services through OBU and message sign board, efficient transfer between public transport modes and between car

² Final Report, Assessment of Capacity and Capacity Building Institutions in the Development Policy Loan Sectors

parking and public transport use (park-and-ride) by smartcard, and so on.

2.4.3 Road-based Public Transport

(1) Introduction

The population of Lahore nearly doubled in 20 years and quadrupled in 40 years, from 2.6 million in 1972 to 5.4 million in 1991 and 9.7 million people today, which represents a 3 % growth per annum since 1991. In the meantime, the vehicle growth reached 17 % per annum between 2004 and 2008 in Lahore. Around 2 million vehicles are estimated to ply the roads of Lahore, majority of these being motorcycles, cars and relatively few buses, taxis and rickshaws.

(2) Historic Trends

Before Independence

As Pakistan gained independence from the British Empire in 1947, the First Five Year Plan (1955-1960) recognized that the most valuable asset of Pakistan was the railways built under the British Rule. Karachi is connected by railway since 1861, and Lahore since 1865. Around 8,100 kilometres of railways connected Pakistani cities in 1947, and rail represented the only inter-urban public transport system while the road network was comparatively underdeveloped.

The first bus service in Lahore started in the beginning of the 20th century with the introduction of the Omni Bus Company by the then British government, plying Mall Road to connect the major buildings and government offices. Model Town, built during the 1920's decade, also started a bus public transport service connecting the town to the rest of Lahore. However, as Lahore is characterized by a mixed land use of homes, work places and bazaars within a short distance, walking remained the most common mode of transport and horse-drawn carriages (tonga) were the main urban public transport mode until the late 19th century.

Urban and inter-urban public transport services have historically been owned and operated by the provincial governments in Pakistan. The Omni Bus service was a public monopoly and expanded both in organization and resources over time.

After Independence

Following the First Five Year Plan, The Second Five Year Plan (1960-1965) encouraged the development of roads and road-based public transport over railway. By pushing private companies to engage towards public transport due to high demand, it led to the development of private wagons along assigned routes. In the seventies public transport became fully deregulated, which also allowed the private sector to compete with public bus companies. However, this measure did not meet the expectations as public

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companies were given the priority over private ones in the allocation of routes.

The Punjab Road Transport Corporation (PRTC) was established in 1977 to provide efficient, adequate, economical, and coordinated public intercity transport services in the province while the Punjab Urban Transport Corporation (PUTC) was established to develop and maintain urban and intra-city bus services. PUTC took over the existing public-owned Omni Buses, and, following a study of Lahore bus system conducted by Volvo in 1980 which led to recommendations toward a continued mix between public and private companies, expanded its fleet with a gift of 350 Volvo buses from the Swedish government. However, even with new buses, the PUTC fleet was too small to provide adequate bus services. As PUTC lacked investment capabilities, it started a leased bus scheme in an effort to attract the private sector – invest in intra-city public transport system.

These efforts eventually proved unsuccessful as the level of bus services degraded and no buses were purchased after 1989. PUTC was disbanded by the government in 1998.

Despite the priority given to road-based public transport services over urban rail for both urban and inter-urban movements, the policies and efforts undertaken after the independence achieved little success in the improvement and quality of public transport in the centre of Punjab.

(3) Structure and Organization

The government has further encouraged the private sector in public transport operation, and the current public transport structure in Lahore is a direct heritage of the 1998 transport policy review, which revamped the structure of public transport services. The franchise scheme was introduced in 1999 by support of the government through the Transport Sector Development Initiative (TSDI), which promoted a privatization and deregulation of public transport, while government agencies regulate the services. New private operators then entered the market, increased the number of buses in operation and significantly improved the public transport situation in Lahore in 1999.

The public transport administration, policy making and planning in Punjab is coordinated by the Transport Department, which was established in 1987 under the West Pakistan Motor Vehicles Ordinance 1965. It is responsible for the licensing of 'high-occupancy' large bus services in Lahore and other large cities, and of public transport services outside the major cities of Punjab through the PTA. Minibus routes are granted by the Lahore DRTA, which was established in 2001 by the Punjab Transport Department, and reports to the CDGL and PTA.

However, in the 2000s the government's attention shifted to other projects (road projects,

rail based public transport (LRMTS), and 4-stroke rickshaws), and as the bus system in Lahore received little consideration the improvements seen since 1999, failed to continue and the situation started worsen since 2006-07. The number of large buses in operation has decreased considerably since 2005 due to poor maintenance, lack of investment, and somewhat unfair competition with the other road-based modes (Wagons). Between 2005 and 2009 no operator entered the market and no additional bus had been added to the depleting fleet.

While the number of buses declined and private operators were unable to meet the overall demand, the services of public transport were provided by smaller, private vehicles such as Wagon, Rickshaw and Qingqi, which have had a significant growth in the later half of the last decade.

In an effort to improve the situation of road-based public transport, the LTC, a state-owned company, was established in December 2009, taking over the infrastructure and regulation responsibilities from the Lahore DRTA.

LTC is primarily a regulatory body and is now the sole organ responsible for custody of all transport infrastructures in Lahore and its operations through a network of private operators. Infrastructures include bus stops, shelters, bays, depots and terminals, while the regulation and operational aspects cover service routes and the buses provided by and operated through a network of private operators.

(4) Key Characteristics and Statistics

Buses

The bus transport service in Lahore district has over 53 planned routes, based on a 2005 survey of passengers and published in Punjab Gazette 2006, yet only 30 routes are operational. Non-operational bus routes are being served by non-permitted vans, coasters, wagons, rickshaws and Qingqis. The lower operating costs of these informal and poorly maintained service vehicles has literally driven out the bus service from these routes. All of the gazetted bus routes are shown on Figure 2.4.9.

Bus service are currently (2010) provided by a fleet of about 250 to 300 buses, almost all of which are older than 2004. However, LTC planned to introduce 2,000 buses within 2010 with the help of 20 % upfront capital cost for new and old subsidies, refurbished buses and to operate the currently non-operated routes. While LTC has law enforcement capabilities and eventually intends to withdraw illegal vehicles (wagons, motorcycle rickshaws) from official bus routes, it has raised several concerns among drivers.

The current operational bus routes are operated by 9 operators: Daewoo, Premier Bus Service, BHK Transport (Sial Express), Makks, Niazi, ABC, Monolite Star, Baloch

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Transport Company and Chattha Brothers.

Minibuses and Wagons

Many public transport vehicles operate without valid license, with an estimated 25 % or more of minibuses with no valid license or documentation at all. It has also been reported that many wagons and coasters are operating without licenses, and that many do not follow the authorized route, sometime do not complete the full route journey, and also provide services to suburbs satellite towns and illegally competing with legal buses although they are not allowed to serve the designated urban high occupancy vehicle (HOV) routes.

Wagon and bus routes should normally be controlled and enforced by DRTA/ LTC, but the inefficiency of public-owned public transport has led to the multiplication of illegal operation and forcing the private vehicle ownership even higher.

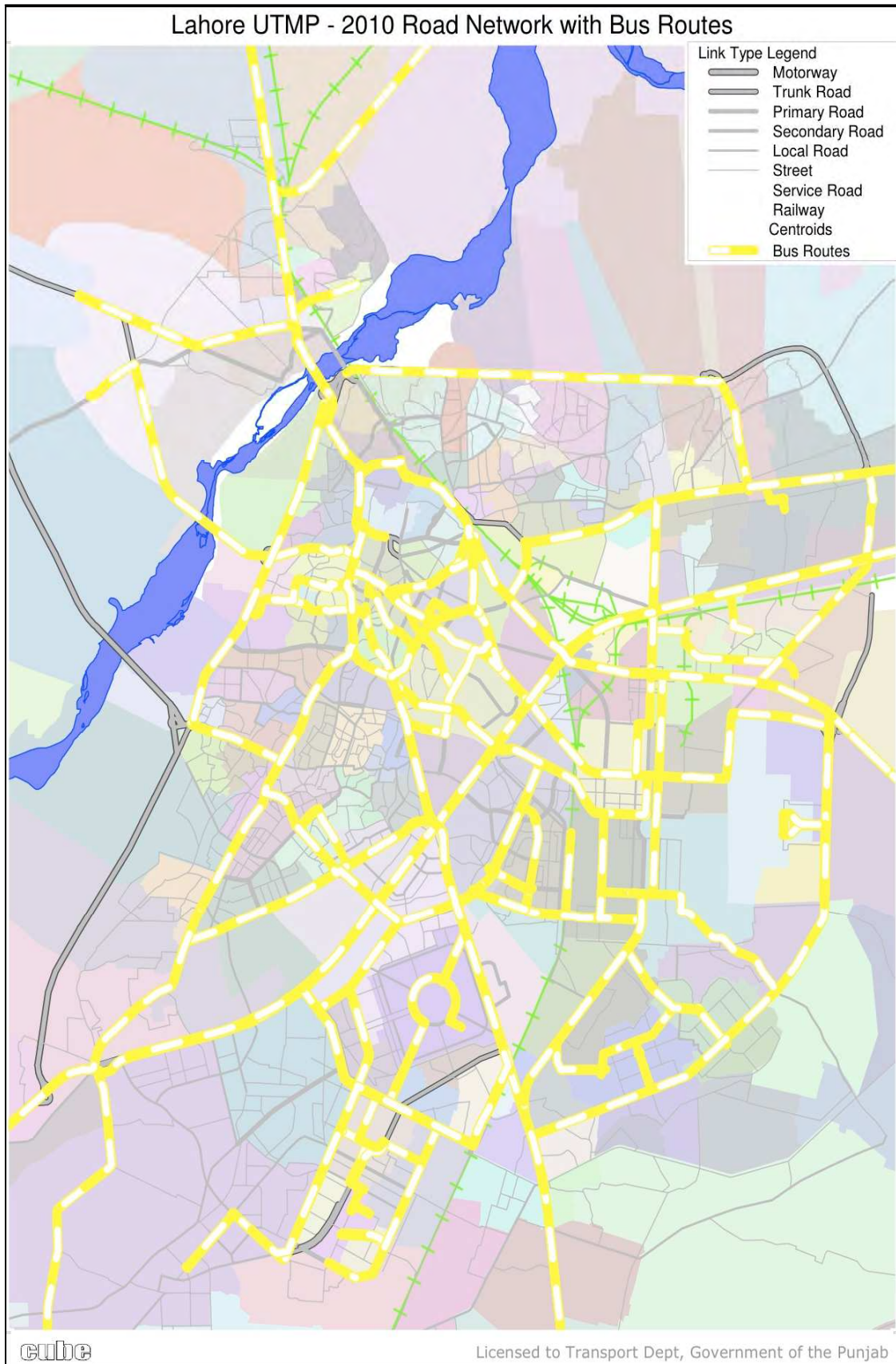
Auto-rickshaws and Qingqis

The number of rickshaws running on the roads of Lahore is about 66,000 as per registration by the Lahore District Registration Authority, but up to 80,000 may actually ply the routes of Lahore when taking into account unregistered vehicles. About 5,000 route permits have also been issued for Qingqis, but it is estimated that as many as 40,000 are currently operating 'illegally' in Lahore, many along primary and secondary roads which are also served by licensed bus services. While there has been no change in the design of the auto-rickshaws over the last 4 decades, the government is currently trying to ban two-stroke engines in favour of CNG fuelled four-stroke rickshaws.

Mode share

Tables below show estimated mode share and trip-making in Lahore, by TEPA for 2007 and by the JICA Study Team for 2006 and 2011. The proportion of non-motorized (mostly walk trips, and some bicycle trips) trips is high, at 45%, while the proportion of public transport trips among motorized trips is around 35% (TEPA) to 38 % (LRMTS). This puts the percentage of public transport share of motorised trips at around 51 % including trips by Rickshaws. This has been declining over the years, due degradation of the Public transport services, and the declining trend of public transport mode share has led to shift of these trips in favour of mostly motorcycle and to some extent car trips, but considering the growth of population and trip-making, the actual number of trips made by public transport services will continue to increase over the next decade.

Figure 2.4.9 Gazetted Bus Route Coverage in Lahore



Source: Lahore Transport Company (LTC)

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Table 2.4.4 Estimated Daily Person Trips in Lahore, 2007

Mode		Trips (,000)	Proportion	Proportion Excluding Walk
Public Transport		3,409	19.3%	35.4%
Private Vehicles	Cars	2,894	16.4%	30.1%
	Motorcycles / Bicycles	3,314	18.8%	34.5%
Mechanised Total (Excluding Walk)		9,617	54.5%	100%
Walk		8,050	45.5%	-
Total		17,667	100%	-

Source: TEPA, 2007

Table 2.4.5 Estimated Daily Motorized Person Trips in Lahore (LRMTS)

Travel Mode	2006		2011 (Forecast)	
	Total (,000)	Proportion	Total (,000)	Proportion
Motorcycle	1,292	18.5%	1,532	18.3%
Rickshaw	1,014	14.5%	1,157	13.9%
Car/Taxi/4WD	1,991	28.5%	2,561	30.7%
Public Transport	2,699	38.6%	3,100	37.1%
Total	6,996	100.0%	8,350	100.0%

Source: LRMTS Study, 2007

Operational Details

The table below shows the distance ranges and fares for bus and wagon routes.

Table 2.4.6 Bus and Wagon Fares, June 2010

Distance (km)	Fare (PKR)
0 – 4	13
4.1 – 8	18
8.1 – 14	22
14.1 – 22	25

Source: Transport Department, 2010

Bus fares have significantly increased since the introduction of the franchised scheme, as they had started at PKR 3 for the 0-3 km distance (representing more than twice the 1999 price when taking inflation into account). The cost of free of charge ridership is high, and is estimated at 3.5 PKR/bus/km according to the Department of City and Regional Planning, with 10 to 15 % of passengers who do not pay a fare.

Table 2.4.7 Key Operational Details

Distance (km)	Distance (km)	Fare (PKR)
Specified headways (minutes)	Peak	5.7
	Off Peak	8.2
Observed headways (minutes)	Peak	9.3
	Off Peak	11.5
Average Speed (km/h)		19
Passenger trip length	<=4 km	40%
	<=8 km	66%
	<=14 km	89%
Bus kilometres (km/day/bus)		234
Operating cost (PKR/km)		29

Source: Department of City and Regional Planning, Study/policy planning of intra city routes in four major cities in Punjab, 2007

2.4.4 Railways

PR (Pakistan Railways) has only a limited role in urban transport of Lahore. It has various kinds of problems in train operation, i.e. late running problems, lack of service, old-type rolling stocks, obsolete maintenance equipment, and so on. Because almost all the trains run late, normal urban railway passengers such as workers and students do not use railway for short- to medium-distance travel.

The punctuality is the most superior point of railway, compared with other transport modes. Therefore the lack of this important feature can be seemed fatal for public usage. The current PR has been on a steady decline. PR (Pakistan Railway) has been a target of the Government of Pakistan for reform, rationalization and privatization for a long time.

2.4.5 Goods Movement

Goods vehicles can be classified in several types: pick-up trucks, delivery trucks, 2 axles, 3+ axles, tractors, construction machines and animal-drawn vehicles. Most of the goods vehicles registered today in Lahore are delivery vans, with around 41,000 registered vehicles in the Study Area, while there are around 29,000 tractors.

As the HIS, conducted in Phase-I of this study, focused on person trips in the future rather than vehicle trips, the movements of goods vehicles was not captured as precisely by this survey. However, traffic count surveys (cordon, screenline, vehicle occupancy, and traffic counts at major intersections) provided estimates of the goods vehicles flows on the network.

Larger trucks are banned from most of the roads in Lahore during daytime, and are only allowed in specific areas. Table 2.4.8 below lists the existing truck terminals in Lahore.

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Table 2.4.8 Truck City Terminals in Lahore

No.	Inter-city Terminals	City Terminals	Freight Loading/ Unloading Terminals
1	Badami Bagh	Lahore Railway Station	Badami Bagh on Ravi Link Road
2	Site close to the Railway Station	Bhatti Gate	Babu Sabu on Bund Road
3	Daewoo stand on Ferozepur Road		Airport
4	Bund Road		Dry Port

Source: Integrated Master Plan for Lahore, 2021

2.4.6 Historical Comparison of Present Traffic Demand with 1990

During the period 1990-1991, JICA conducted the first full-scale urban transport study or the “Comprehensive Study on Transportation System in Lahore” with cooperation of LDA and TEPA. This on-going study intends to totally renew the year 1990 traffic database by means of various traffic surveys including HIS, cordon, screenlines surveys, public transport user interview survey and through others data collection and analysis.

Although complete new traffic database has not been established at this stage of reporting, this section attempts to make some historical comparisons between recent other survey results and the year 1990 database. After the JICA study 1991, sporadic traffic count surveys were conducted for several road projects while a city-wide traffic survey was done in 2005 for the Lahore Rapid Mass Transit System (LRMTS) Feasibility Study. The LRMTS database is quoted for historical comparison. As results, the historical comparison shows the following characteristics; which are compared in Figure 2.4.10 and 2.4.11.

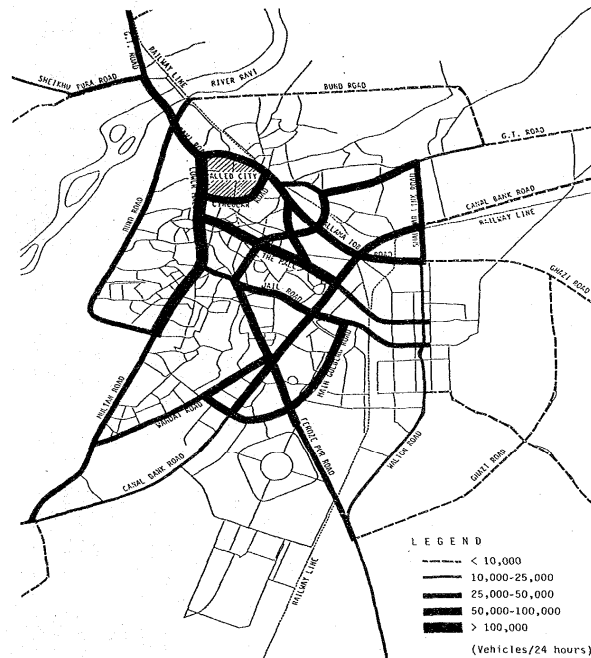
Expansion of urban transport activity area: The two transport studies illustrate existing traffic demand maps on the city’s road network (see Figure 2.4.10 and 2.4.11). Although detailed demand degree settings vary from each other, the two images differ in urban transport area and it means the extension of urban transport area particularly to the east, southeast and southwest directions as the city’s urban areas have considerably expanded.

Road traffic increase: We observe 4-wheeler road traffic increase at all the comparable lines and points between 1990 and 2005. However, increase rates vary from 149 % (6.2 % p.a.) at the West Canal Screen Line to 752 % (15 % p.a.) at the Inner Southeast Cordon Point. Significant traffic increase can be found at the fringe of urban areas due to acute urbanization and densification of existing urban areas during this period.

Change in modal share: In 1990, bicycle, rickshaw and horse carriages took an important role in urban transport. The 1990 HIS reported that they enjoyed a person trip share of 15 %. Due to their small passenger capacity and slow speed, such non-motorized

transport means excluding walking occupied more road space than the modal share. Nowadays the role of the old non-motorised modes is marginal and all animal drawn modes have converted to rickshaws and in narrow urban streets to Qingqis.

Figure 2.4.10 Road Traffic Demand in 1990



Source: Comprehensive Study on Transportation System in Lahore, JICA, 1991

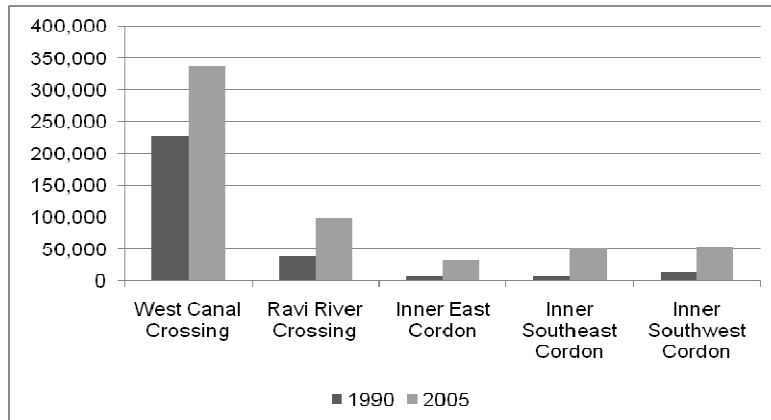
Figure 2.4.11 Road Traffic Demand in 2005



Source: LRMTS, 2006

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Figure 2.4.12 Change in 4-wheeler Road Traffic, 1990 and 2005



Source: Comprehensive Study on Transportation System in Lahore, JICA, 1991 and LRMTS, 2006

2.5 Transport Demand Characteristics

2.5.1 Road Traffic Volume

Screenline surveys were undertaken based on the screenlines as shown in Figure 2.5.1. The road traffic as determined from the Screenline surveys is summarised in Table 2.5.1. Of note in Table 2.5.1 is the absence of a 1991 screenline of Ravi River. There are dramatic increases in the traffic volumes across the screenlines, most notably in the South and East. This is likely due to the development of the Cantonment area, DHA and the general development away from the Walled City.

Table 2.5.1 Comparison of Screenline Crossing Flows since 1991 JICA Study

Screenline	1991 JICA Study			2011 JICA Study			Growth Per Annum (%)		
	All Vehicle	2 Wheel	4 Wheel	All Vehicle	2 Wheel	4 Wheel	All Vehicle	2 Wheel	4 Wheel
Railway: North of Ravi River	-	-	-	131,559	61,846	69,713	-	-	-
Ravi River	81,169	42,533	38,636	201,942	74,316	127,626	4.7%	2.8%	6.2%
Railway: North of Canal	277,332	201,627	75,705	525,867	310,993	214,874	3.3%	2.2%	5.4%
Railway: South of Canal	165,300	83,882	81,418	653,282	340,351	312,931	7.1%	7.3%	7.0%
Canal: West of Railway	439,877	212,790	227,087	828,521	362,421	466,100	3.2%	2.7%	3.7%
Canal: East of Railway	76,207	58,187	18,020	383,161	228,653	154,508	8.4%	7.1%	11.3%

Note: 2 Wheeled Vehicles are Bicycles, Motorcycles and Animal Drawn Carts.

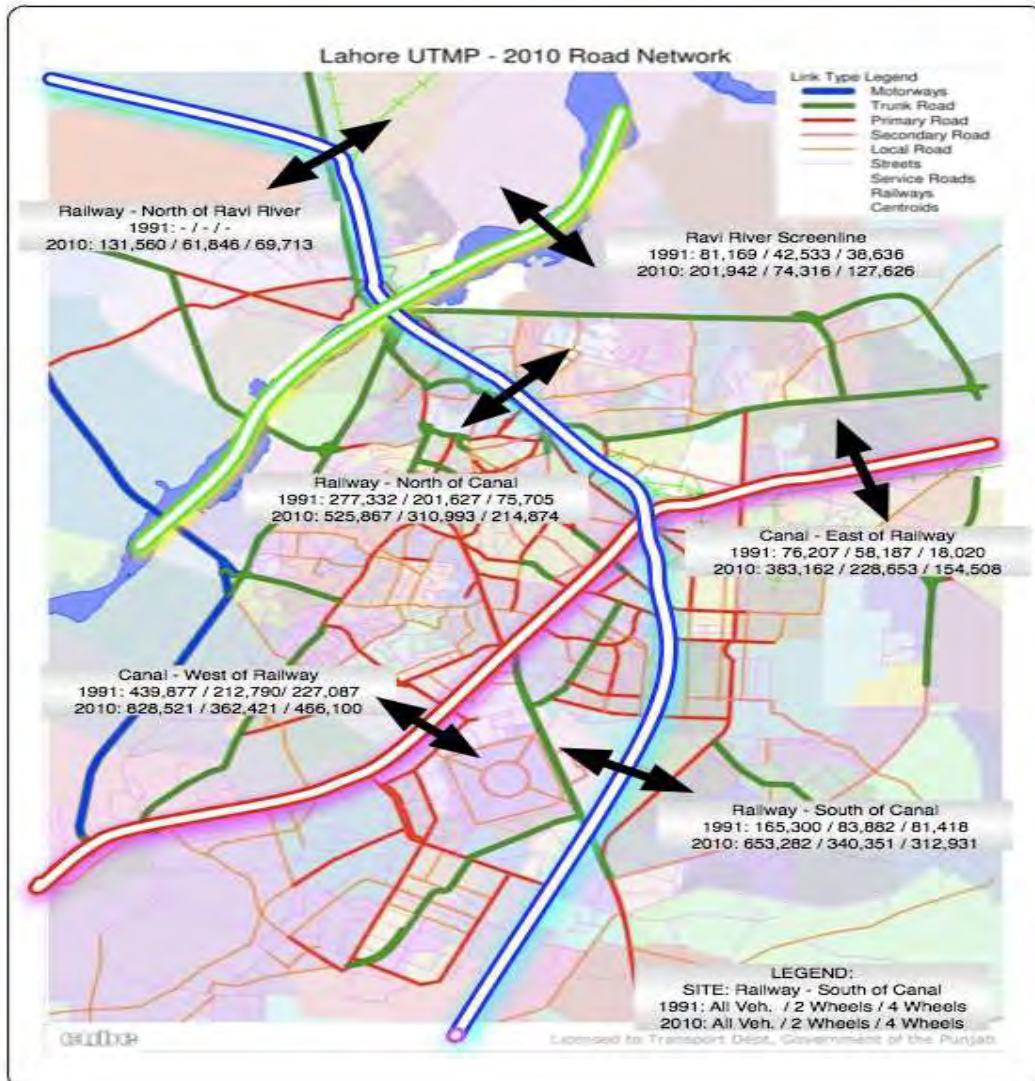
4 Wheeled vehicles included cars, wagons, buses, trucks.

Source: JICA Study Team

Figure 2.5.2 to 2.5.5 show hourly variation of traffic volume on the Canal Screenline and the Railway Screenline by direction and by vehicle type. Note that the traffic volume is the total of all survey locations on the screenlines on these sections.

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Figure 2.5.1 Major Screenlines in Lahore

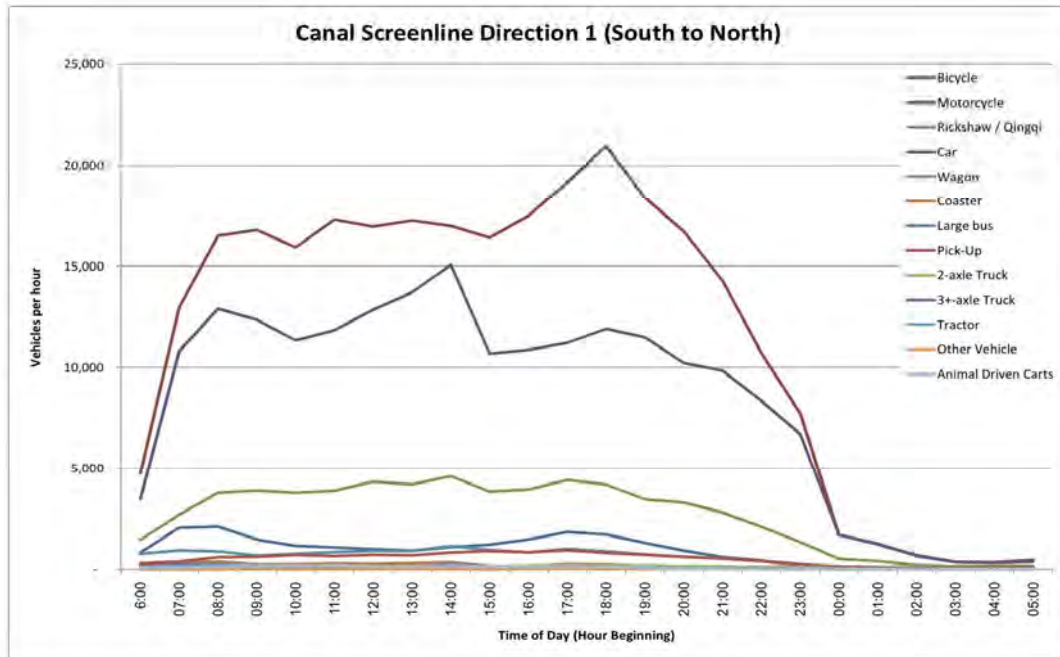


Source: JICA Study Team

On the Canal Screenline, motorcycle and car are the dominant mode although the number of motorcycle is larger than that of car. Hourly traffic volume is distributed relatively equally from morning till evening with unclear peaks in the morning and evening. For car, there is a vague peak at around 1-2 o'clock.

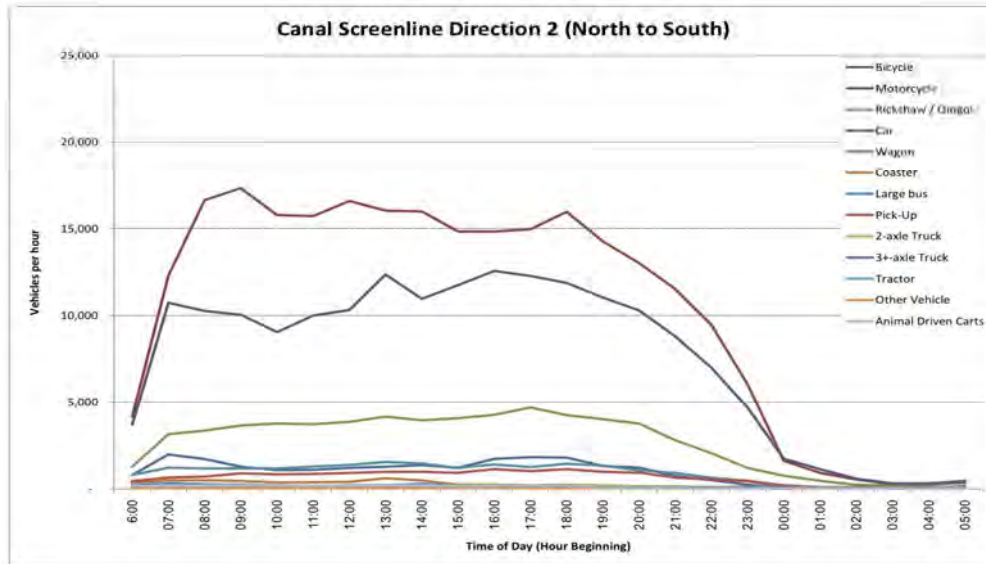
On the railway screenline, the dominant mode is motorcycle. Car traffic is less compared to the Canal screenline. Hourly traffic volume is also distributed relatively equally from morning till evening. However, motorcycle has a peak around 8-9 a.m. for east to west direction and around 18-19 p.m. for west to east direction. The traffic volume of trucks is relatively large on this screen line.

Figure 2.5.2 Hourly Variation of Traffic Volume on Canal Screenline (South to North)



Source: JICA Study Team

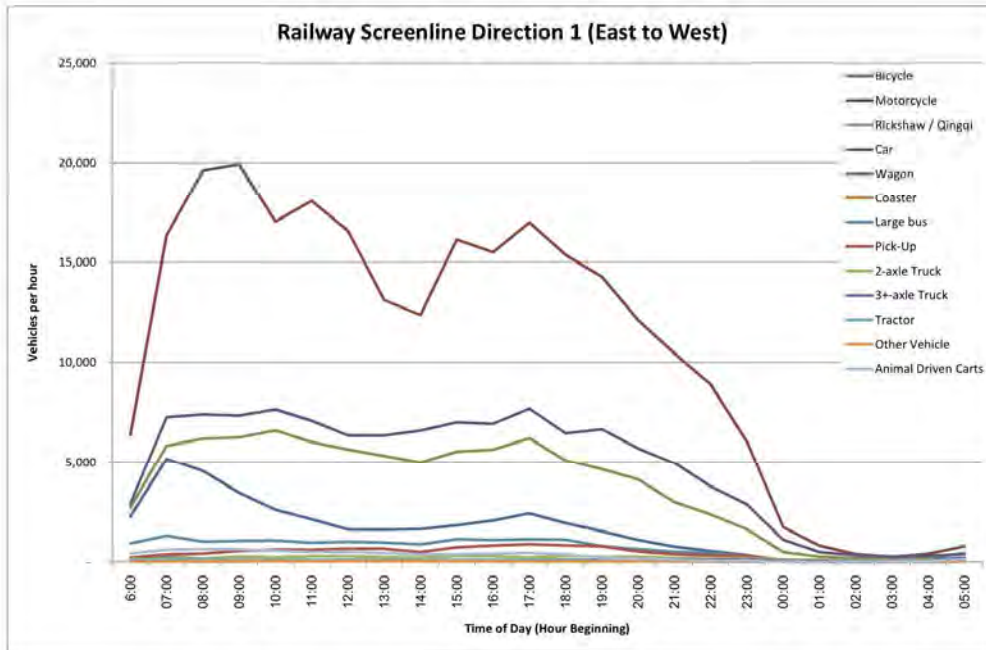
Figure 2.5.3 Hourly Variation of Traffic Volume on Canal Screenline (North to South)



Source: JICA Study Team

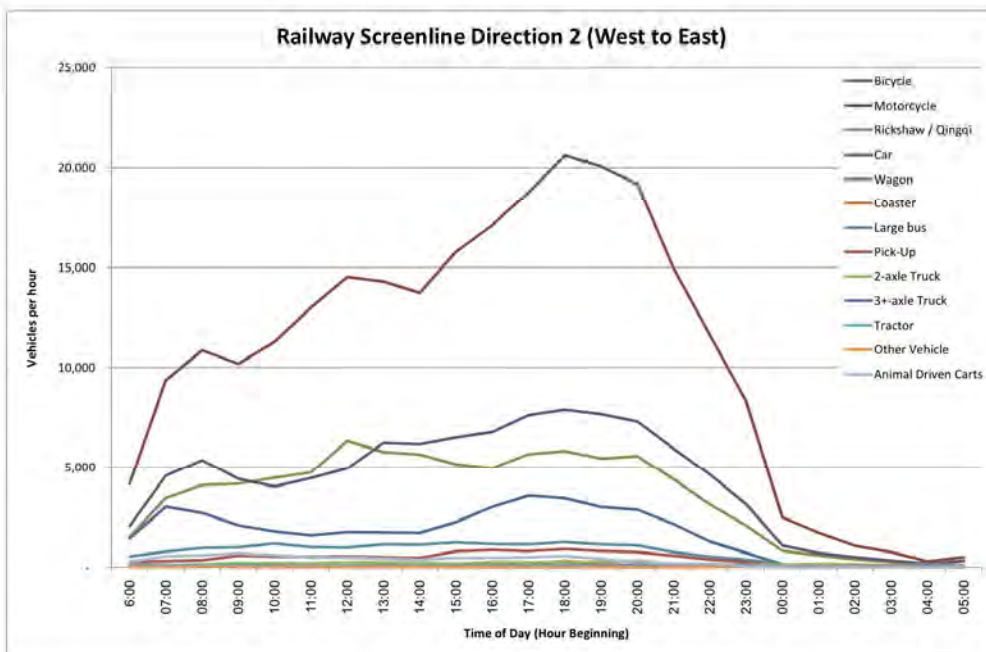
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Figure 2.5.4 Hourly Variation of Traffic Volume on Railway Screenline (East to West)



Source: JICA Study Team

Figure 2.5.5 Hourly Variation of Traffic Volume on Railway Screenline (West to East)



Source: JICA Study Team

2.5.2 External Traffic Volume

Cordon Surveys were undertaken along the cordon as shown in Figure 2.5.6. The External Traffic volume as determined from the Cordon surveys are summarised in Table 2.5.2.

Table 2.5.2 Outer Cordon Traffic Volumes since 1991 JICA Study

Cordon	1991 JICA Study			2010 JICA Study			Per Annum Growth		
	All Vehicle	2 Wheel	4 Wheel	All Vehicle	2 Wheel	4 Wheel	All Vehicle	2 Wheel	4 Wheel
Northern	21,780	7,334	14,446	39,424	7,378	32,047	3.0%	0.0%	4.1%
Northeastern	2,294	1,544	750	6,172	1,841	4,331	5.1%	0.9%	9.2%
Eastern	-	-	-	172	0	172	-	-	-
Southern	19,932	11,573	8,359	21,097	7,017	14,080	0.3%	-2.5%	2.6%
Southwestern	8,127	879	7,248	28,174	4,647	23,527	6.4%	8.7%	6.1%
Western	16,026	3,323	12,703	65,691	5,187	60,504	7.3%	2.3%	8.1%

Note: 2 Wheeled vehicles are Bicycles, Motorcycles and Animal Drawn Carts.

4 Wheeled vehicles included cars, wagons, buses, trucks.

Source: JICA Study Team and Comprehensive Study on Transportation System in Lahore, JICA, 1991

In 1991, there was no cordon survey at the Wagah Border Crossing, so there are no vehicles recorded at the Eastern Screenlines. In any case, the traffic volumes across the border are very low. It is also important to note that the cordons are in different locations between the two studies. A strict comparison is misleading, but serves as an indicator of the changes in traffic volumes over time.

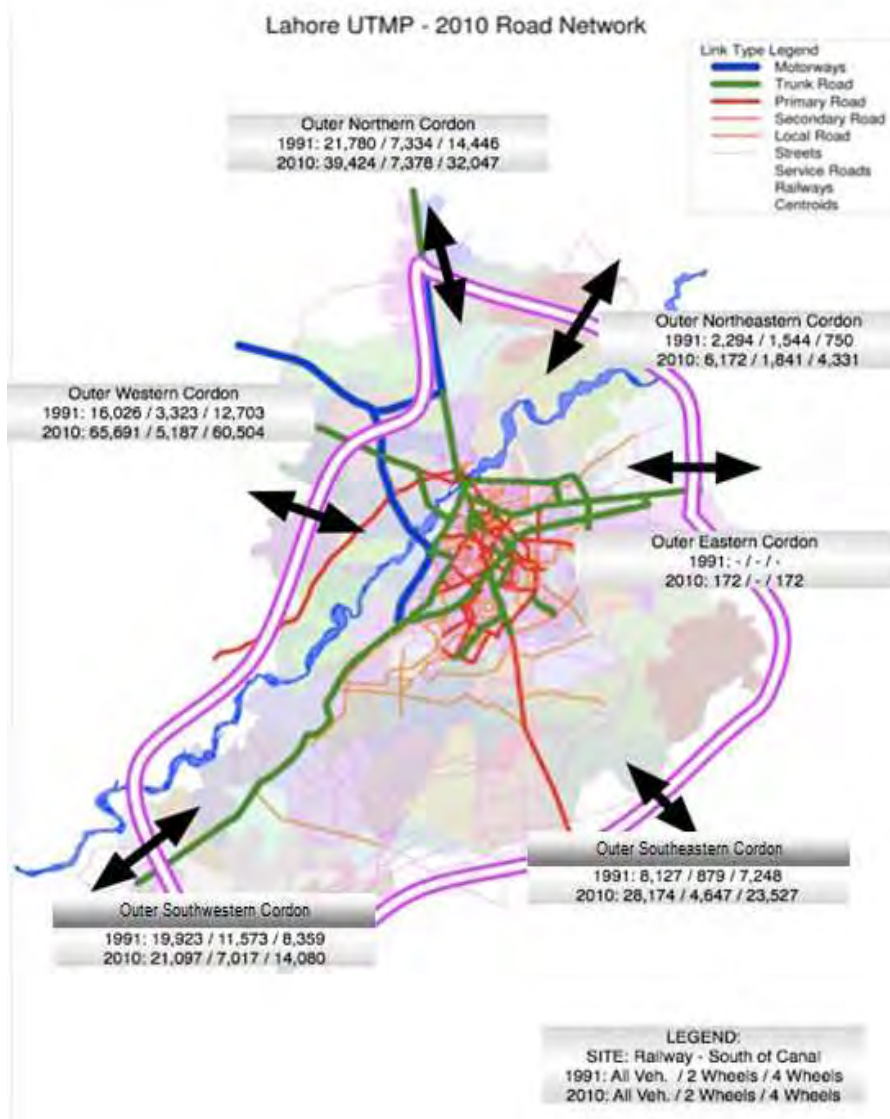
The current study has not surveyed an inner cordon, so there is not basis for comparing the 1991 JICA Study inner cordon.

Figure 2.5.7 and 2.5.8 show hourly variation of traffic volume at the Cordons by direction and by vehicle type. Note that the traffic volume is the total of all survey locations at cordon.

On the cordon, the dominant mode is car followed by motorcycle then wagon. Hourly traffic volume is distributed relatively equally from morning till evening. However, outbound car traffic has a peak at around 11 a.m.

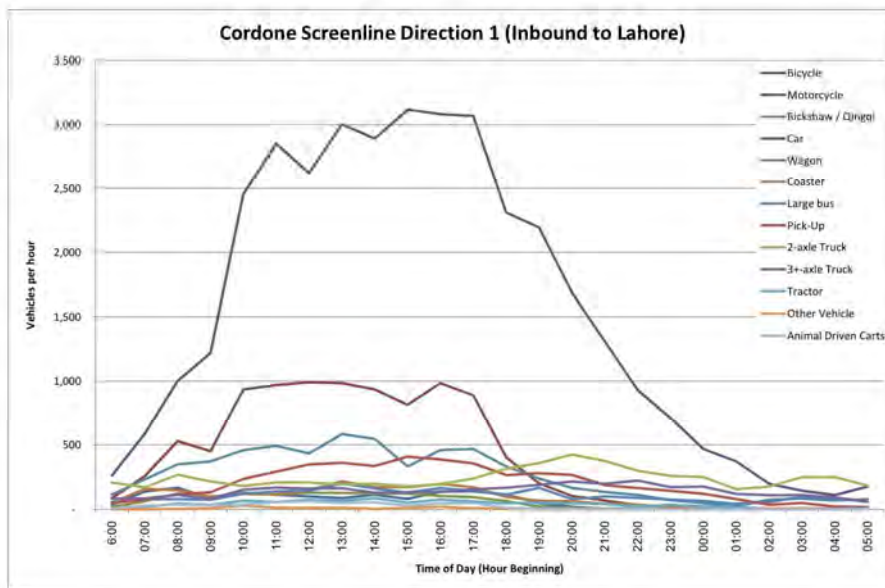
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Figure 2.5.6 Cordon Boundary in Lahore



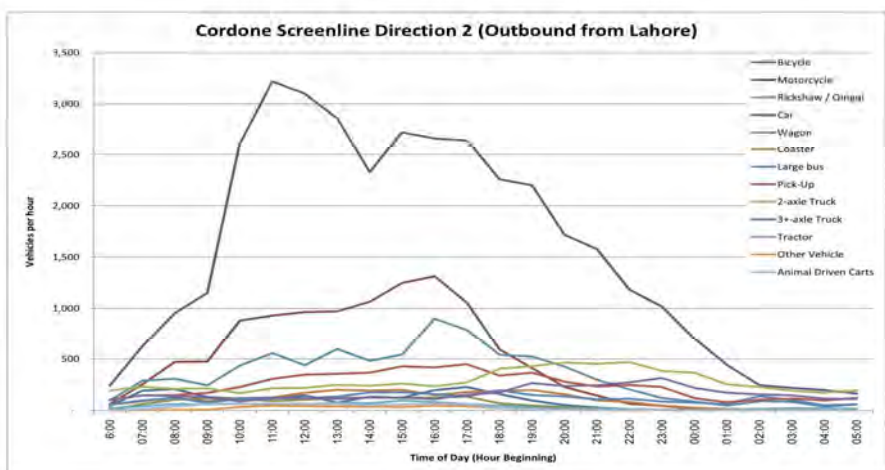
Source: JICA Study Team

Figure 2.5.7 Hourly Variation of Traffic Volume at Cordon (Inbound)



Source: JICA Study Team

Figure 2.5.8 Hourly Variation of Traffic Volume at Cordon (Outbound)



Source: JICA Study Team

2.5.3 Person Trips

In the Study Area, in 2010 about 12 million trips are made in a day as shown in Table 2.5.3. However, about 3.7 million trips or 32 % of the total trips are of short-distance walking. Excluding walking, about 8.1 million trips are made on a usual weekday.

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Table 2.5.3 Number of Person Trips in the Study Area by Mode and by Trip Purpose, 2010

Travel Mode		No. of Trips by Trip Purpose ('000/day)					
		To Work	To School	Private	Business	To Home	Total
Private	Bicycle	152	72	11	5	231	472
	MC (Driver)	775	206	123	76	1,110	2,290
	MC (Passenger)	72	171	28	8	223	501
	Car	382	191	155	56	732	1,517
	Truck	2	1	1	0	4	7
	Sub-Total	1,383	640	319	145	2,300	4,786
Public	Bus/Mazda/Wagon	418	253	131	34	784	1,620
	Rail/Air	1	0	0	0	3	4
	Rickshaw	129	171	75	9	368	751
	Qinggi	170	71	53	7	311	612
	Sub-Total	718	495	259	50	1,466	2,987
Others	Taxi	1	1	1	0	3	6
	Private Bus	28	99	2	0	127	256
	Others	13	3	2	1	17	37
	Sub-total	42	103	5	1	147	299
	Walk	561	1,197	86	41	1,845	3,729
Total	(including walk)	2,705	2,436	668	236	5,756	11,801
	(excluding walk)	2,144	1,239	582	195	3,911	8,072

Source: JICA Study Team

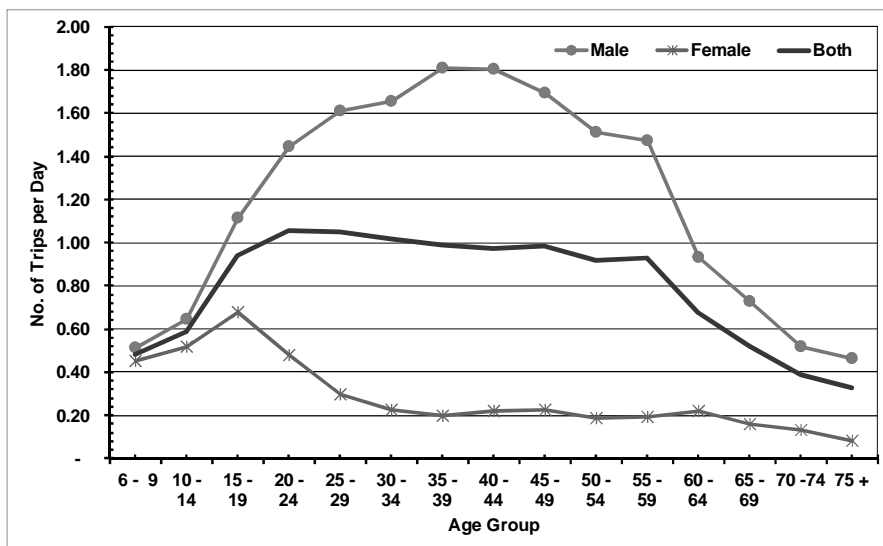
Table 2.5.4 shows the daily trip rates (No. of trips divided by population). On average, the residents in Lahore make 1.14 trips a day including walking or 0.76 trips a day excluding walking. This is very low at almost half the level compared to other mega-cities in Asia such as Manila, Ho Chi Minh and Jakarta. This may be attributed to the existence of inactive female population and the high percentage of unemployment. Figure 2.5.9 further shows the trip rate distribution by gender and by age group.

Table 2.5.4 Trip Rate of Lahore Residents, 2010

Mode	Male	Female	Total
Including walking	1.59	0.60	1.14
Excluding walking	1.12	0.32	0.76

Source: JICA Study Team

Figure 2.5.9 Trip Rate by Gender and by Age Group

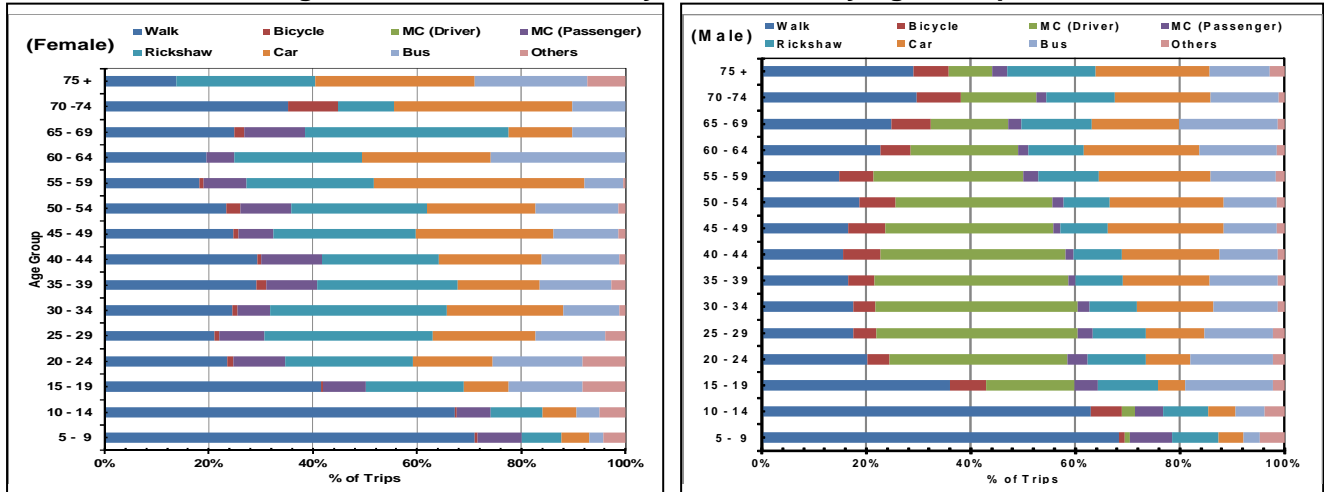


Source: JICA Study Team

2.5.4 Model Shares

Figure 2.5.10 presents model shares by gender and by age group. Female largely depend on walking and uses rickshaw relatively frequently. Male travels by motorcycles more than female. Females are usually passengers.

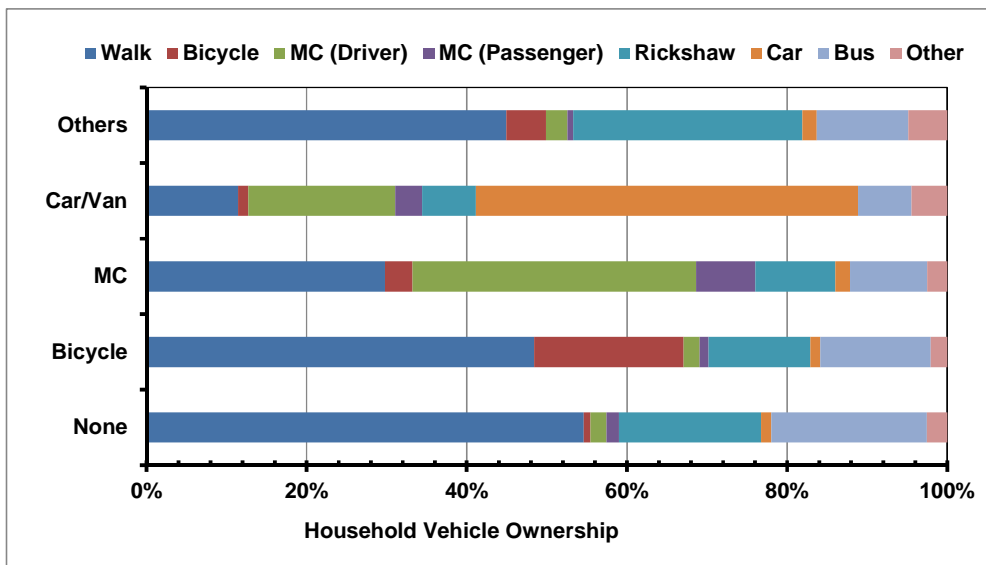
Figure 2.5.10 Model Share by Gender and by Age Group, 2010



Source: JICA Study Team

Car owning households naturally use cars more frequently, but they use motorcycles as well because they often have motorcycles too, as presented in Figure 2.5.11. Motorcycle is used mainly by motorcycle owning households and car owning households. Public transport such as bus and rickshaw is important for non-vehicle owning households. Modal shares do not change much depending on trip purpose. “To School” trips tend to use buses more than other trips due to school bus services.

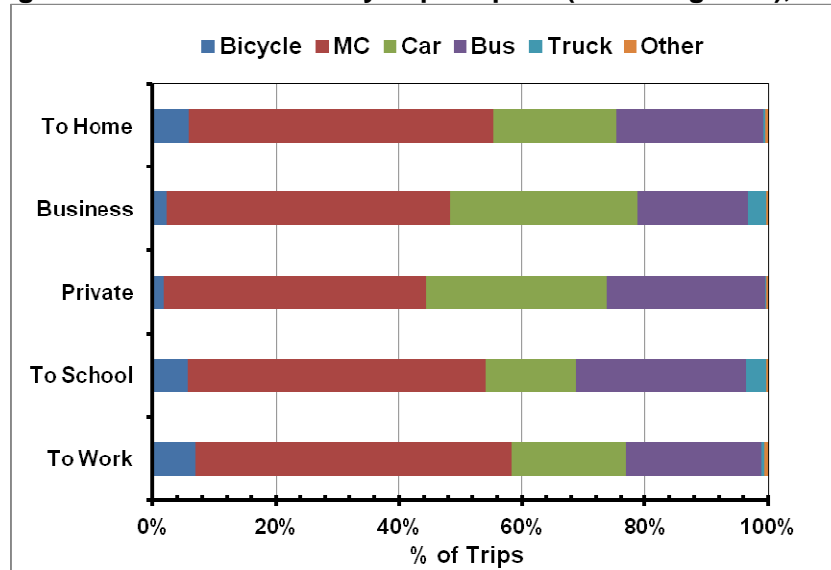
Figure 2.5.11 Model Share by Household Vehicle Ownership, 2010



Source: JICA Study Team

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Figure 2.5.12 Modal Share by Trip Purpose (excluding walk), 2010



Source: JICA Study Team

2.5.5 Trip Generation/ Attraction

Table 2.5.5 presents the total trip generations/ attractions by Town/ Tehsil. Data Gunj Baksh and Gulberg attract a greater number of “To Work” and “To School” trips than trips for the same purpose generated from the area. Shalamar, Samanabad, Aziz Bhatti are typical residential towns where more “To Work” trips are generated than attracted.

Table 2.5.5 Trip Generation/ Attraction by Town/Tehsil, 2010

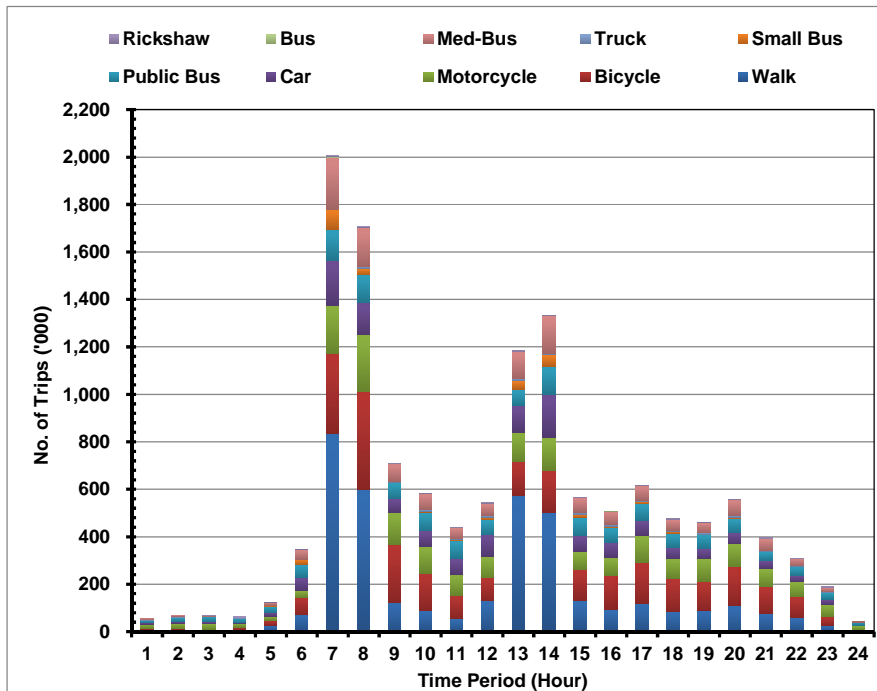
No	Town/ Tehsil	Generations ('000/day)						Attractions ('000/day)					
		To Work	To School	Private	Bus	To Home	Total	To Work	To School	Private	Bus	To Home	Total
1	Ravi	226	92	39	21	426	803	272	72	62	38	336	781
2	DataGB	161	122	52	16	771	1,121	453	248	92	34	308	1,135
3	Samanabad	218	137	85	35	405	880	170	172	66	31	422	860
4	Shalamar	295	130	44	16	208	693	102	91	25	13	470	701
5	Gulberg	214	155	71	25	713	1,177	381	238	90	32	425	1,166
6	AzizB	188	124	41	14	189	556	88	62	31	9	360	550
7	Wagah	129	81	37	6	157	410	80	48	32	5	239	405
8	Nishter	179	70	41	16	204	510	126	41	34	8	312	523
9	Iqbal	207	135	79	24	424	870	262	135	82	25	379	882
10	Cantt	182	132	49	26	369	758	194	122	63	14	374	767
11	Ferozewala	90	44	45	12	90	282	62	20	27	6	154	269
12	Muridke	47	21	27	4	62	159	62	21	28	4	80	195
13	Sharaqpur	11	9	15	1	23	59	10	8	10	0	29	57
14	Kasur	36	20	7	4	20	87	11	7	4	0	49	72
15	Patoki	40	19	13	3	43	117	29	14	17	4	82	146
	Total	2,223	1,290	644	223	4,103	8,483	2,302	1,299	665	223	4,021	8,509

Source: JICA Study Team

2.5.6 Hourly Distribution of Trips

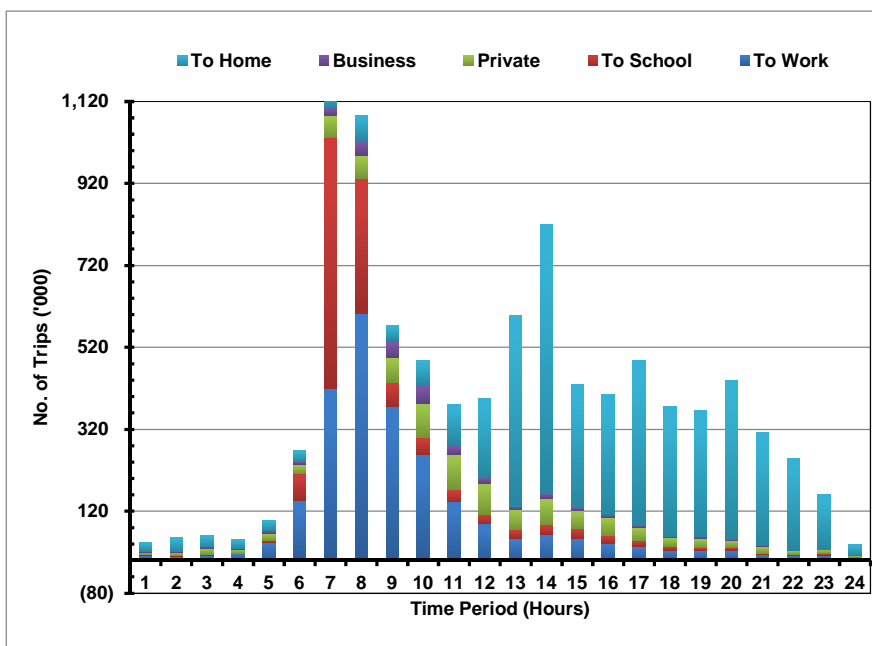
Figure 2.5.13 and 2.5.14 show hourly distribution of trips generated by time of the day, classified by mode and by trip purpose. There are two peaks around 7-8 a.m. and 1-2 p.m. The morning peak is due to “To School” and “To Work” trips and the afternoon peak is due to “To home” trips made by students/ pupils. A large number of walk trips are seen in these peak hours.

Figure 2.5.13 Hourly Distribution of Trips by Mode, 2010



Source: JICA Study Team

Figure 2.5.14 Hourly Distribution of Trips by Trip Purpose (excluding walk), 2010

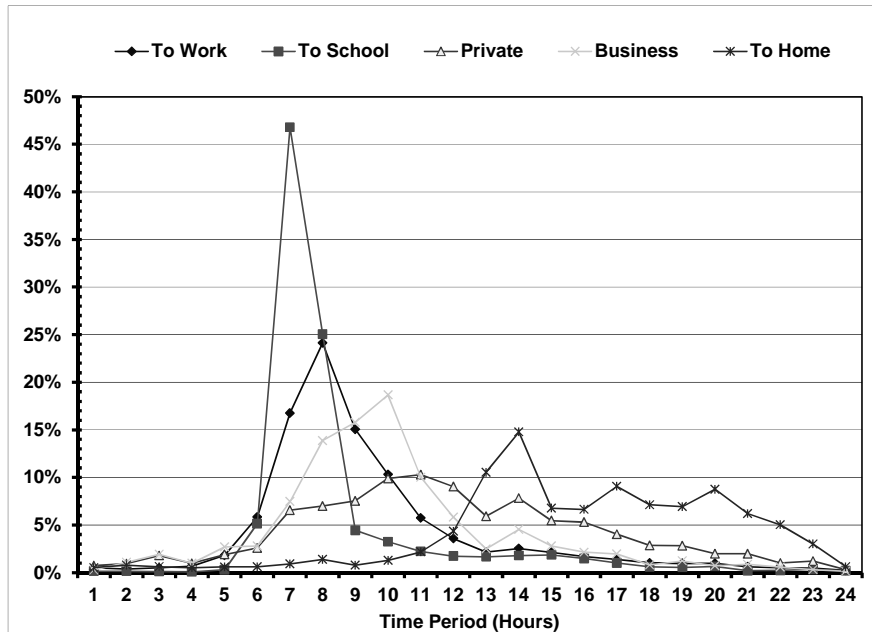


Source: JICA Study Team

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The tendency described above can be clearly seen in Figure 2.5.15. “To School” and “To Work” trips make a sharp peak around 7-8 a.m. and “Business” and “Private” trips are made mainly in the morning period. “To Home” trips are made relatively equally from 1-2 p.m.

Figure 2.5.15 Hourly Distribution of Trips by Trip Purpose in terms of Percentage (excluding walk), 2010



Source: JICA Study Team

2.5.7 Travel Time and Speed

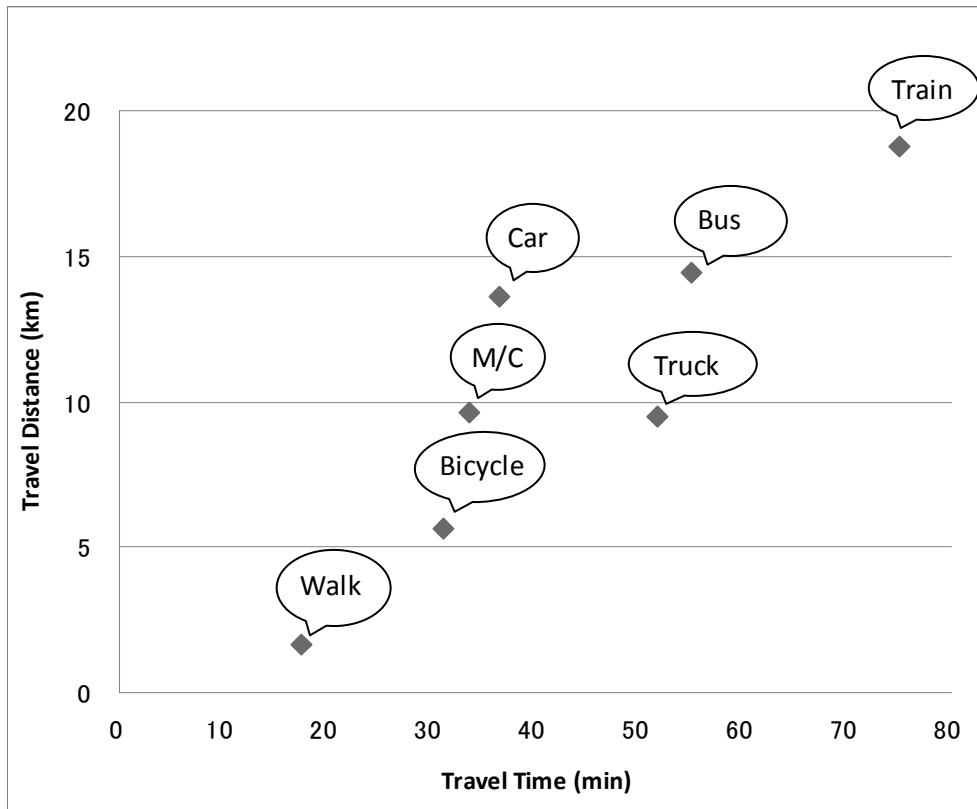
The average travel time of Lahore residents is 38.3 minutes as a whole. About 62 % trips are less than 30 minutes as shown in Table 2.5.6. However, about 9 % of the trips exceed 60 minutes. The relation between travel time and distance can be illustrated by mode schematically as presented in Figure 2.5.16.

Table 2.5.6 Number of Trips by Travel Time and Trip Purpose, 2010

Travel Time	No. of Trips by Trip Purpose (000/day)					Total
	To Work	To School	Private	Business	To Home	
- 10 min	135	148	48	20	276	628
- 20 min	364	337	91	37	693	1,522
- 30 min	659	391	117	55	1,211	2,434
- 40 min	122	64	27	9	252	475
- 50 min	210	107	40	15	360	733
- 60 min	307	107	74	19	533	1,041
- 75 min	52	20	12	4	97	185
- 90 min	69	30	23	6	114	242
- 120 min	40	18	18	1	82	159
120 min +	14	5	11	1	37	69
Total	1,975	1,227	462	168	3,655	7,487
Average (min.)	38.9	31.9	42.8	34.3	38.8	37.8

Source: JICA Study Team

Figure 2.5.16 Average Travel Time and Distance by Travel Mode, 2010

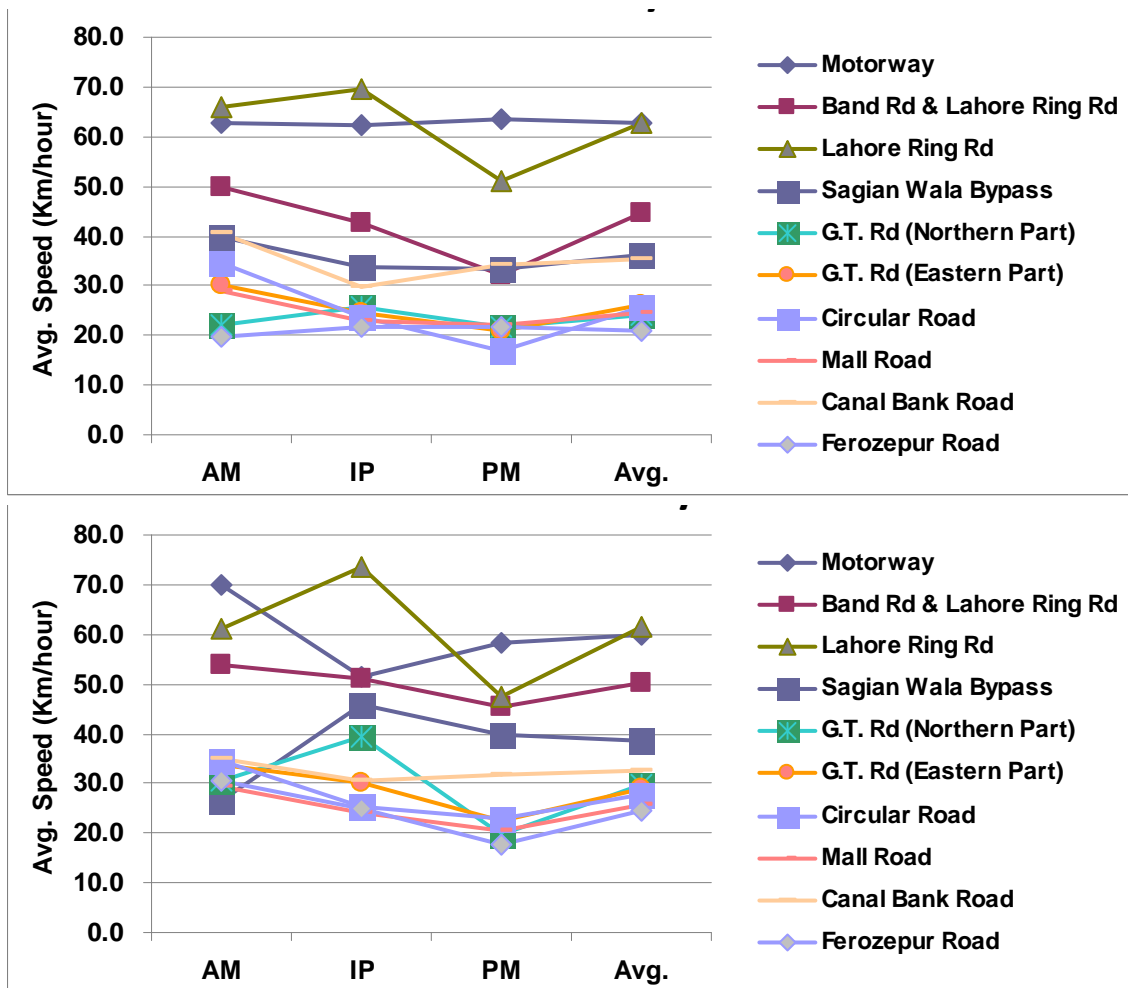


Source: JICA Study Team

Figure 2.5.17 shows the result of LUTMP travel speed survey. Motorway and Lahore Ring Road show high travel speed of above 50 km/h throughout the day. Circular Road, Mall Road, Ferozepur Road and G.T. Road (east and north) show a relatively slow speed of 20 to 30 km/h throughout the day. This indicates the serious traffic congestion in the city centre and along the north – south radial corridor of the city.

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Figure 2.5.17 Average Travel Speed on Selected Roads



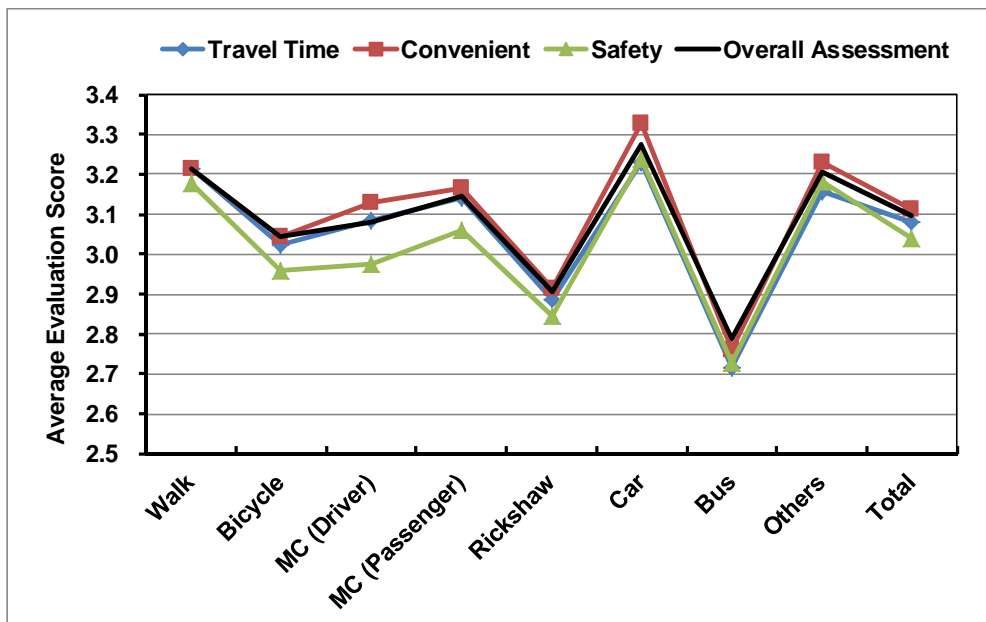
Source: JICA Study Team

2.5.8 Trip Makers' Assessment of Their Journey

In LUTMP HIS, questions were asked to interviewees on their assessment of the journey they make. Figure 2.5.18 depicts this assessment of the mode they have used. In general, their scoring is lower for public transport trips including bus and rickshaw.

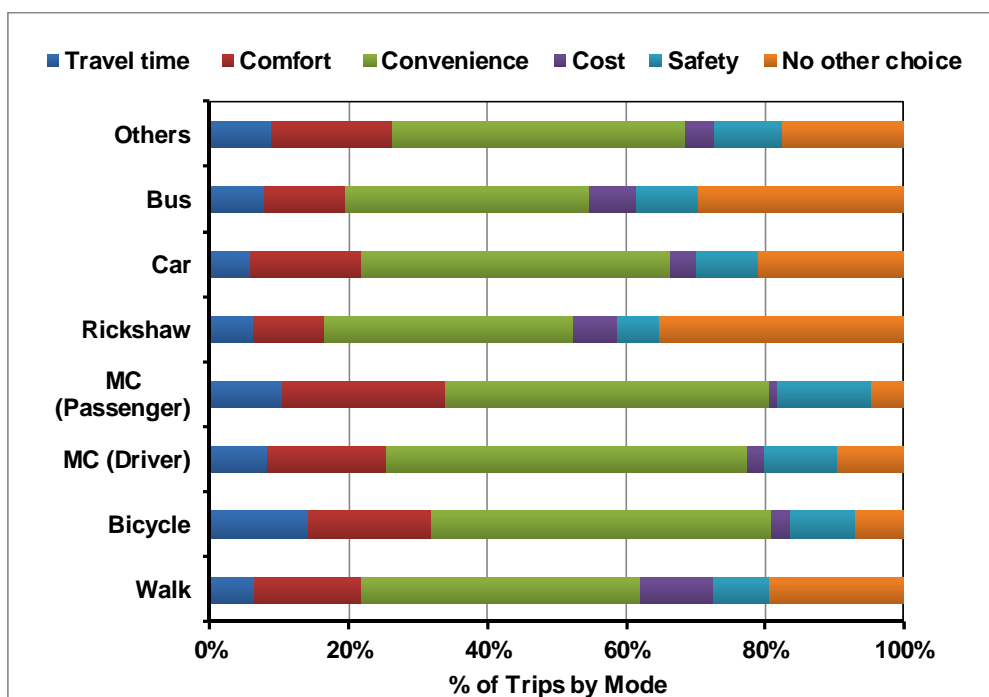
Figure 2.5.19 shows the reason of mode choice. Albeit no large difference is seen by mode, "No Other Choice" answer is significant for bus and rickshaw. For these modes, "Convenience" was least selected.

Figure 2.5.18 Average Evaluation Score by Mode, 2010



Note: 5-point evaluation – 5: very good, 4: good, 3: so-so, 2: bad and 1: very bad
 Source: JICA Study Team

Figure 2.5.19 Reason of Modal Choice, 2010



Source: JICA Study Team