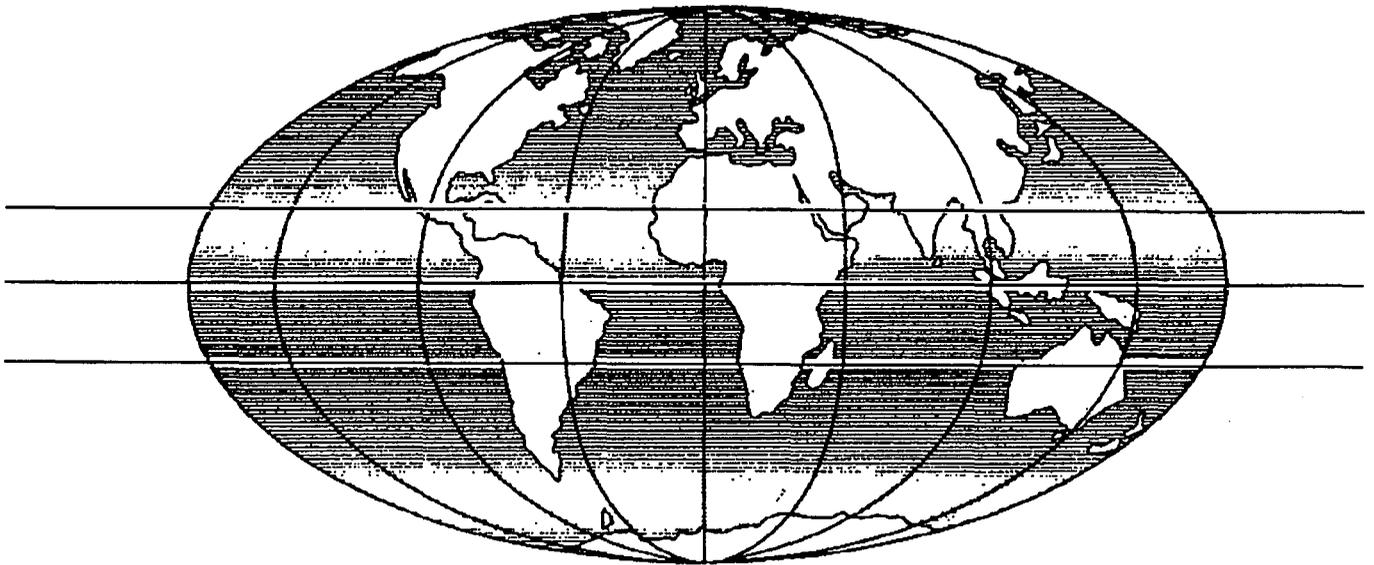




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**TITLE Attitudes and travel behaviour of residents
in Pune, India**

by D Maunder, C Palmer, A Astrop and M Babu



**Overseas Centre
Transport Research Laboratory
Crowthorne Berkshire United Kingdom**

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ATTITUDES AND TRAVEL BEHAVIOUR OF RESIDENTS IN PUNE, INDIA

David Maunder, Christian Palmer, Angela Astrop (Transport Research Laboratory, UK);
Madhu Babu (Central Institute of Road Transport, India)

ABSTRACT

In many cities of the developing world, the rapid rise in population coupled with the limited financial resources available for investment in urban infrastructure has led to severe transport and mobility constraints. These problems are exacerbated by locating the low income on city fringes where land is available but employment opportunities are scarce, thereby generating substantial demand for low cost travel to workplaces and other amenities.

The paper discusses the findings from a travel survey in Pune, India. This survey forms part of a research project, funded by the UK Overseas Development Administration, aimed at identifying those factors which influence travel demand in low income households, and the problems and constraints faced by females in terms of mobility and accessibility.

It is hoped that the results will provide transport policy makers with an improved understanding of travel constraints and thereby enable the formulation of better transport development projects in the future. This should enable the low income, and especially women, to have improved accessibility to the transport network, and hence mobility.

1. INTRODUCTION

In a number of developing cities the rapid rise in population, coupled with increasing costs of fuel and the limited financial resources available for investment in urban infrastructure has produced severe transport problems. These are exacerbated by the tendency to locate the low income on city fringes far away from employment opportunities thereby causing considerable difficulties both for the residents in terms of mobility and accessibility and transport operators in terms of the need to provide low cost public transport services.

Sustainable urban development requires continuous investment in infrastructure to ensure basic services for urban residents, and investment in transport is no exception. In the near future, as a result of financial constraints, an improved public transport system is likely to be the only solution to the problem of increasing traffic congestion and chaos in most cities of the developing world. Such a solution enables all groups to enjoy increased mobility and accessibility: "Indeed, it is unlikely that the communities concerned can (or even should) afford to build a road network needed to accommodate unrestrained travel by private car" (Jacobs & Fouracre, 1976).

Before resources are allocated to improving transport infrastructure and increasing public transport provision in all areas but especially those inhabited by the urban poor, it is necessary to discover what improvements need to be made to the network in order to meet the basic travel needs of residents. One means of obtaining this information is by undertaking surveys on travel demand throughout the city to gather data on frequency and mode of travel,

problems incurred when making journeys etc. In addition, it is also necessary to obtain background information on the area studied and the culture of the society being examined, as these factors can have a major influence on travel behaviour.

The Transport Research Laboratory, as part of an Overseas Development Administration funded Technology Development and Research (TDR) programme, has undertaken studies of urban travel behaviour in three developing country cities: Accra in Ghana, Medellín in Columbia and Pune in India. Pune was selected as a case study for the project as a large number of residents presently use motorised two wheelers, e.g motorcycles and motorscooters and historically used cycles. In addition, as public transport services comprise suburban rail, stage bus, taxi and autorickshaws it was thought that the residents would have a wide choice of travel mode from journeying on foot to train services. Also, during the 1980's, a cycle network was established to encourage the use of cycles within the urban agglomeration. The network was planned to consist of lanes where cycles were segregated from motor vehicles. Therefore, the low income of Pune have access to a wide range of public transport services as well as traffic lanes dedicated to cycles should they own and operate one.

The aim of the research is to discover which factors influence travel demand in low income households. In addition, particular emphasis has been placed on understanding the travel behaviour of women, as females are often more disadvantaged than men in terms of access to transport services and infrastructure. It is hoped that the results of the research will provide policy makers at the local level and at the centre with an improved understanding of travel constraints, and will therefore enable the formulation of better transport developmental projects which should in turn, provide improved mobility and accessibility to the transport network for low income households and particularly women in the developing world.

2. RESEARCH METHODOLOGY

In order to understand the travel demand and behaviour of households in Pune, five questionnaire surveys were carried out during May 1996. Firstly a household travel survey was undertaken in nine neighbourhoods. All household members aged sixteen years and over were interviewed in respect of their travel behaviour; the head of the household also answered a series of questions relating to the travel behaviour of any persons under sixteen years of age. In addition to the household survey, interviews were conducted of female users of motorised two wheelers (mopeds, motor scooters and motorcycles), of female cyclists and of women using public transport. A number of interviews of male public transport users were undertaken to enable a comparison of public transport usage between men and women.

Both motorcyclists and cyclists were stopped during their journey and interviewed at the roadside. The public transport users (both bus and rail users) were interviewed either on-board the vehicle whilst travelling, or while waiting at the bus stop or station.

In summary, the five surveys composed:

	Sample Size
• Household survey	328 households
• Female Cyclists	204
• Female motorised 2 wheelers users	587
• Female public transport users	788
• Male public transport users	227

3. PUNE METROPOLITAN REGION

Pune is an important regional centre of the State of Maharashtra and is situated 177 km south east of Bombay and covers around 810 square km. The population is now around 2.5 million, compared to 800,000 in 1971, representing an increase of over 200 per cent over the twenty-five year period.

The importance of Pune as an industrial centre has grown rapidly since the 1960's when industrial expansion in Bombay was banned. Consequently Pune has become a major centre in the state, having attracted heavy engineering industry such as motor vehicle manufacturing plants (buses, cars and motorcycles). In addition to this, a number of multi-national companies such as Phillips have manufacturing bases within the city. The industrial expansion of Pune was further aided by the Maharashtra Industrial Development Corporation who offered incentives to encourage industrial growth. Much of the local industry is concentrated along the main Pune-Bombay highway, enabling manufactured goods to be dispatched and supplies given to the factories without having to access the more congested centre of Pune.

Rural to urban drift and the inward migration from other regions of India to Pune has occurred because of increased employment opportunities created by rapid industrialisation. This has led to an acute housing shortage and an increase in slum settlements which are poorly served by transport infrastructure and services. There has also been a dramatic increase in the number of educational establishments in Pune over the last 25 years. The corresponding rise in the number of students has placed additional demand on public transport services and the entire transportation system.

4. TRANSPORT PROVISION

4.1 PUBLIC TRANSPORT

Rapid population growth and industrial expansion have placed heavy demands on both the transport infrastructure and public transport services, so that the present transport infrastructure in the city struggles to keep pace with the increasing population and their travel demands.

Bus services are supplied by Pune Municipal Transport (PMT) and Pimpri-Chinchwad Municipal Transport (PCMT). PMT currently operates 818 buses operating 63,400,000 km of route and transports approximately 227,500,000 passengers per annum; the corresponding figures for PCMT are 248 buses operating 15,500,000 km, and carrying 48,000,000 passengers. Bus fares are charged on the basis of km travelled, and range from a minimum fare of 140 paise for 2 km to 1485 paise for a journey of 60 km (in May 1996 the Indian Rupee, US Dollar exchange rate was US \$ 1 equivalent to Rs 38).

In more developed countries, bus travel is increasingly viewed as a way of easing congestion in town and city centres, and therefore there has been an increase in the number and variety of bus priority measures in use. In Pune however, little thought has been given to bus priority measures, and due to the present road layout and driving behaviour, implementation of such measures would be problematic. Financial constraints have made it difficult for the bus companies to expand their fleets, to replace ageing vehicles and to generally provide an

efficient service. Bus operations are further hindered by congestion, shortage of road space and a lack of road discipline.

In response to a lack of public transport provision, a number of major manufacturing companies have begun providing commuter bus services for the sole use of their employees thereby guaranteeing that their workforce arrive on time for their shifts. There are around 4000 company buses in Pune, which is over four times the number of public buses, and therefore suggests that there is considerable under-provision in the public sector service at the present time. The company buses are well utilised throughout the day due to the three shift system worked by most manufacturers.

In addition to local bus services, there are a number of inter-city bus routes which offer services between Pune and other major cities such as Bombay, Bangalore and Hyderabad. A number of different standards of service are on offer, ranging from express air conditioned buses to stopping services; the price of the journey is reflected in the quality of the service.

Since 1977 there has been an airport at Pune. As well as daily flights to Bombay (where connections can be made to both domestic and international flights) there are less frequent flights to other destinations in India. The local airport has recently been refurbished to offer a higher quality to aid passenger comfort.

Pune is connected by rail to Bombay, Hyderabad, Madras and Miraj-Kolhapur. Many people use these services to commute daily either to or from Pune. There are currently 2515 taxis in Pune (of which 1900 are tourist cars); these taxis tend not to provide services within Pune; rather they serve inter-city routes from Pune to Bombay, Thane, Nasik, Ahmednagar, Kolhapur and Aurangabad.

Autorickshaws have replaced horse drawn tongas as the major form of intermediate public transport in Pune. They operate anywhere within Pune and are the major operator of taxi services within the city. Autorickshaws tend to serve areas with poor bus service provision and offer a relatively cheap source of transport; for example, they are used to transport groups of children to school. The growth in the number of auto rickshaws along with other vehicles is shown in Table 1. The data illustrates the dramatic increase in the number of auto rickshaws which has occurred over the last 25 years.

Table 1 Growth in the number of registered mechanised vehicles

	1960	1970	1980	1994
Public Bus			434	994
Truck	1590	3628	8302	21008
L.C.V.	18	333	2506	5432
Car, jeep, taxi	2658	7565	13962	37208
Autorickshaw	207	2560	11038	22093
Two-wheeler	1315	15048	72040	295008
Other	185	844	1753	2341

4.2 PRIVATE TRANSPORT

Historically, Pune was known as the "cycle city of India", however cycling has decreased in popularity as the ownership and use of motorised two-wheelers has increased. There has been rapid growth in the number of motorised two wheeled vehicles so that there are currently around 118 motorised two wheelers per 1000 population compared to 5.0 in 1965. The growth in motorised two wheelers is shown in Table 1. As a result of this growth, lanes dedicated for cycle users are now mainly used by motorised two wheeler users.

The growth in private car ownership has been slow due to the high purchasing and operating costs. In 1975 there were 7.2 cars per 1,000 population, by 1994 this had approximately doubled to 14. This contrasts with 337 cars per 1000 population in Great Britain in 1995 (Department of Transport, 1996). Clearly, the motorised two-wheeler is the 'motor car' of the middle income of India.

5. HOUSEHOLD SURVEY

5.1 INTRODUCTION

The aim of the household survey was to obtain information about individuals' travel patterns and attitudes and relate them to various household variables such as income, structure and location with respect to the central business district (CBD). Two research tools were developed specifically for this task, both taking the form of an interviewer-administered questionnaire. The first questionnaire (general travel survey) concentrated on information about individuals, the second (head of household survey) sought information about the household.

5.1.2 DESIGN AND SUBJECTS

Household income and distance from the home to the CBD are two variables of particular importance. The 328 households interviewed (comprising 1005 residents) were classified in terms of a measure of per capita income and distance from the CBD. The criteria used for classification are as follows:

	Monthly per capita income	Distance from CBD
Low/near	Rs 0 - 1250	0 - 3 Km
Mid	Rs 1251-2500	3 - 9 Km
High/far	Rs 2501 or more	more than 9 Km

The number of households and individuals interviewed in each segment of the matrix are given in Table 2.

Table 2: Number of households and individuals interviewed

	HOUSEHOLDS				INDIVIDUALS			
	Income				Income			
DISTANCE	Low	Mid	High	Total	Low	Mid	High	Total
Near	46	23	15	84	174	73	68	315
Mid	55	62	29	146	179	174	76	429
Far	25	52	21	98	73	142	46	261
TOTAL	126	137	65	328	426	389	190	1005

5.2 RESULTS

5.2.1 INTRODUCTION

Whilst in effect there are eighteen experimental groups (three by three matrix by sex), it was decided that for the purposes of analysis, comparisons between all possible group pairs would be too complicated as well as unnecessary (because the emphasis of the study is on the behaviour of the urban poor). Accordingly the analysis has been completed on two levels. In Section 5.2.2 the distance grouping have been collapsed, allowing income groups to be compared whilst, section 5.2.3 looks at the low income group, but compares male and female respondents.

5.2.2 DIFFERENCES BETWEEN INCOME GROUPS

5.2.2.1 Demographic differences

Table 3 shows the means for a number of demographic and household variables. It should be remembered that households were assigned to groups on the basis of measured per capita income, defined as income per person over the age of 16 years (not income divided by household size).

Table 3: Demographic and household variables

	Income Group		
	Low	Mid	High
Percentage of male respondents	58%	60%	58%
Mean age of respondent	35.8	36.0	36.9
Percentage of male household heads	95%	90%	81%
Age of head of household	45	43	43
Household size	6.3	4.7	4.3
Household income (Rs)	3211	5956	18389
Per capita income (Rs)	742	1755	5801
Transport expense (Rs)	446	815	2031
Transport expense as % of household income	15.5%	14.0%	13.5%

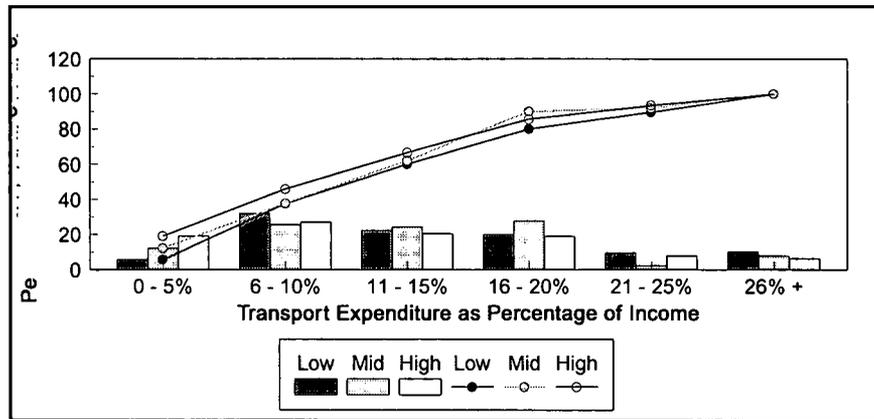
Household size decreases from low through mid to high income households. This is as one would expect in the developing world. It is interesting that there is a higher percentage of female household heads in the high income group than in the low income group. This could be related to either household size or household income. Large households are perhaps more likely to be able to provide a suitable male replacement in the event of death or other absence. In relation to the latter, having significant wealth is likely to allow a female rather more independence or respect, and thus the ability to run the household without the need to find a male replacement.

Whilst it is not statistically significant, the final statistic - percentage of monthly household income spent on transport - is interesting and is consistent with the findings of a number of other studies of households in India (e.g Maunder, 1984). It should be noted that these figures have been calculated using data pairs (income and expenditure) for individual households, rather than using group means. Figure 1 further illuminates the expenditure data, and shows frequency values for the three income groups for grouped percentage expenditure.

The line corresponds to cumulative frequency. The graph demonstrates the reason for the non-significance of the result, namely the large spread of figures with respect to the magnitude of the mean.

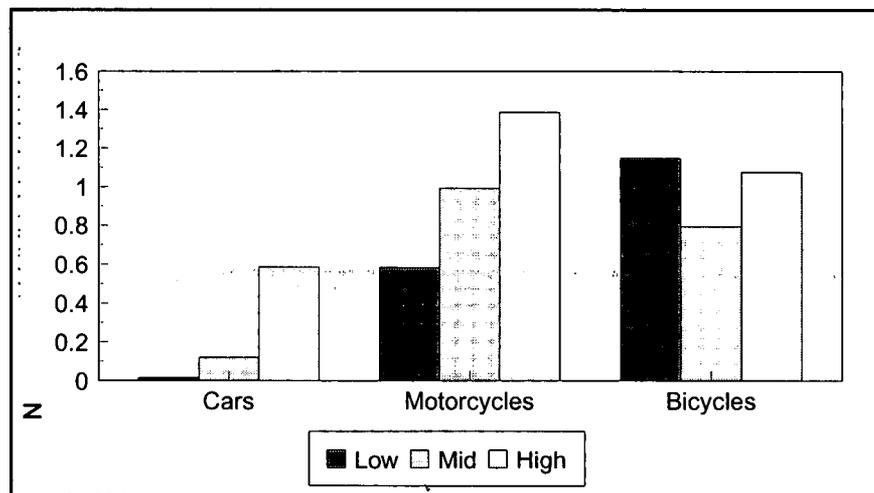
Vehicle ownership varies greatly between groups. This can be seen in Figure 2 which shows the mean ownership rates for cars, motorcycles and bicycles for households in the three income bands.

Figure 1: Relationship between income group and transport expenditure



All three groups have a level of bicycle ownership at around one per household. Ownership of both cars and motorised two-wheelers follows the predicted relationship with rising household income; these are expensive item to own and operate.

Figure 2: Vehicle ownership levels



5.2.2.2 General trip characteristics

Respondents were asked a number of questions about the journeys that they make. These questions were posed in two different ways: First respondents were asked about the journeys that they make regularly; secondly they were asked about journeys for specific purposes.

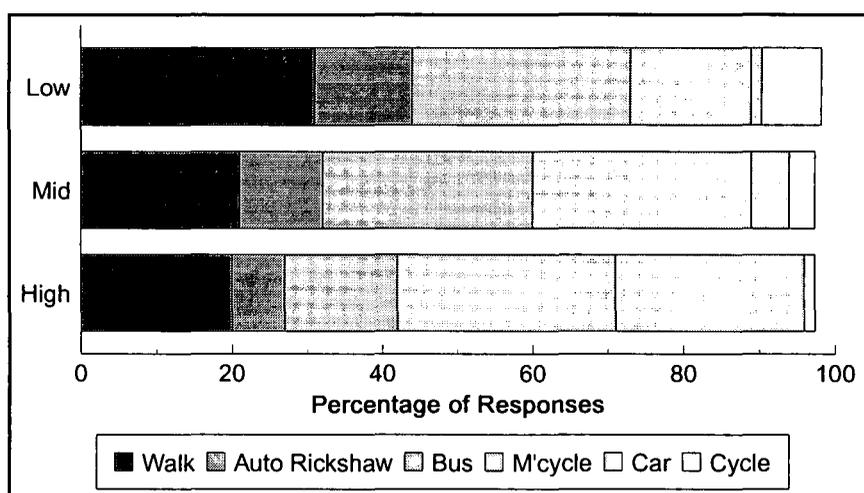
Before commencing detailed analysis of the data it is worth discussing general differences between the income groups. Table 4 shows the mean number of (return) trips made each day by individuals from the three income bands. It can be seen that the three groups are remarkably similar. To find differences in trip rates one must investigate trips for specific purposes (see Sections 5.2.2.3 to 5.2.2.5).

Table 4: Daily per capita trip rates

	Income Group		
	Low	Mid	High
Number of return trips per day	1.03	1.04	1.02

Modal choice is a variable of considerable interest, since it is likely to be highly affected by income levels. Figure 3 shows the proportion of trips made by the income groups using different modes. There are obvious differences between the groups in modal choice. For instance, the use of motor cars increases with income. The same is true of motorised two-wheelers, although in all three groups a significant number of trips are made by this mode.

Figure 3: Modal choice by income group; all trips



The modes incurring little or no cost are favoured by the low-income group which is predictable. Interestingly, a higher proportion of trips are made by autorickshaw by the lower income group than by the higher income group, despite being expensive (compared to the bus). It could be that the higher income groups simply do not like to travel by autorickshaw, and the decision is not financial. An alternative explanation - supported by the finding that the high income group also make less journeys by bus - is that high income individuals do not need to use these modes because of their high levels of motorised vehicle ownership.

In Figure 3 and all subsequent Figures relating to modal choice there is no 'other mode' category. In order that the Figures are not too confusing, the 'other' category appears as the blank area between the last bar and the 100 per cent marker.

Table 5 shows the mean journey distance by mode for the income groups. As one might expect, the low income group travel further using cheaper, more effortful modes (walk and bicycle) than the higher income groups, although for cycling the difference is only marginal. The high income group travel further by car, motorcycle and bus than the low income group. This difference is reflected in differences in mean journey distance for all modes.

Table 5: Mean journey distance, by mode (km)

	Income Group		
	Low	Mid	High
Private car	3.5	8.0	11.2
M'cycle/scooter	6.9	8.0	8.1
Bicycle	4.3	3.9	4.2
Public Bus	7.9	9.5	10.5
Auto rickshaw	4.0	5.1	3.3
Walk	2.0	1.3	0.9
All modes	5.4	7.2	7.1

5.2.2.3 Work trips

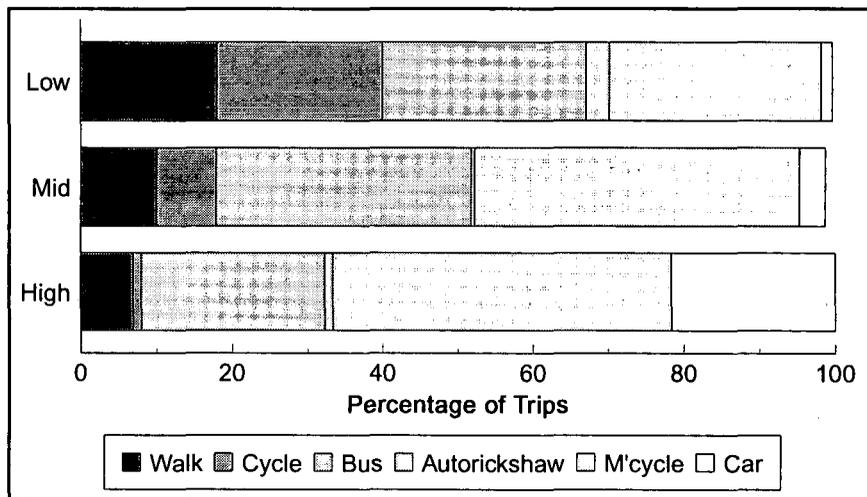
The frequency of work trips was more or less uniform across the whole population, with most people working five days per week or more.

Figure 4 shows inter-group differences in modal choice for work trips. It can be seen that walking as a mode of transport is more highly favoured by individuals from low income households. Cycling also follows a similar pattern. The opposite trend clearly occurs in relation to travel by car, and to a lesser extent to travel by motorcycle/scooter. It is interesting to note that the most common mode of transport (the modal mode) for all three groups is the motorised two-wheeler (motorcycle), reflecting the rise in ownership of these vehicles even by low income households.

The percentage of trips made by personal motorised vehicles equates to 30 per cent, 47 per cent and 67 per cent for low, mid and high income individuals respectively. For personal non-motorised travel (walk and cycle) the figures are 40 per cent, 18 per cent and 8 per cent respectively. This relationship is probably related not only to income but also to the distance that the three groups tend to travel for work journeys (6.2 km, 9.7 km and 11.0 km respectively)

Buses, both public and company owned, are utilised for a considerable percentage of work journeys: 27%, 34% and 25% respectively. Therefore, even though utilisation of local trains and auto rickshaws for work trips appears to be low, public transport carries a significant number of people to work, regardless of income group.

Figure 4: Modal choice by income group; work trips



5.2.2.4 Shopping trips

A much higher proportion of the low income group (80 per cent) reported making shopping trips than either the mid (53 per cent) or the high (47 per cent) income groups. This suggests that in low income households there is more sharing of household duties between members.

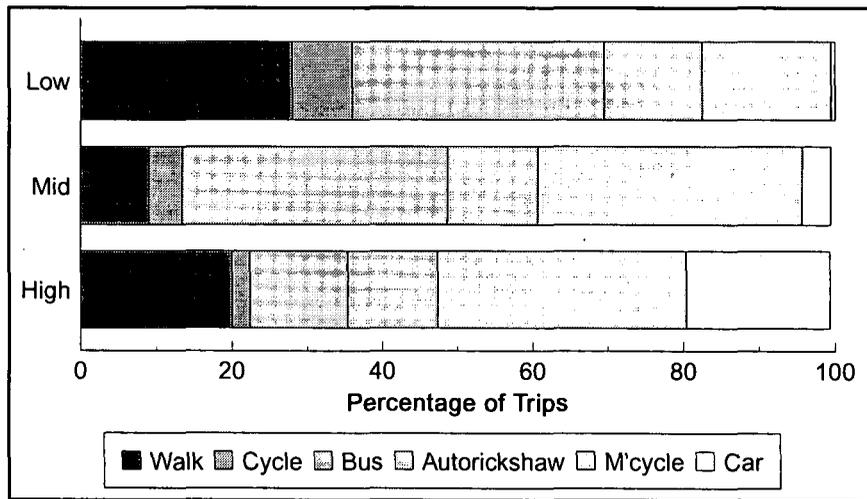
For all three groups the modal frequency response was 'once per week'. The pattern of responses for three groups are similar. However, individuals from low income families are much more likely to shop five times per week or more, compared to the mid and high income groups. Since many low wage jobs are in the informal sector they are usually paid daily, and thus it is often impossible to purchase more than one days supplies.

The pattern of modal choice for shopping trips differs from that for employment purposes, and is shown in Figure 5.

The relationship between modal choice and income is not so distinct, especially for less costly modes. For example, both low and high income groups make a higher percentage of walk trips than the mid-income group. This is likely to be a result of differences in mean journey length, which is 4.5 km, 6.0 km and 3.8 km for low, mid and high income groups respectively.

For high-cost modes - cars and motorcycles - the expected pattern is found; usage increases with income. The percentage of trips made by personal motorised vehicles is 18%, 39%, and 52% respectively for the three groups. The percentage of trips made by personal non-motorised modes are 36 per cent, 13 per cent and 22 per cent respectively. Public transport, in the form of buses and auto rickshaws, is used by many individuals from all three groups, being utilised for 46 per cent, 47 per cent and 25 per cent of journeys respectively.

Figure 5: Modal choice by income group; shopping trips



For shopping trips the three groups differ in terms of the modal mode. For the low income group it is the bus (32% of journeys) but for mid and high income groups it is the motorcycle/scooter (35% and 33% respectively).

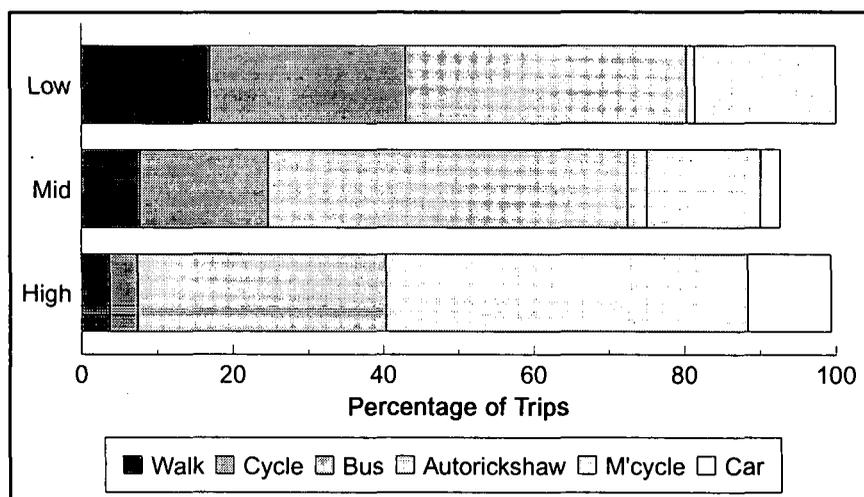
5.2.2.5 Education trips

Many of the people interviewed (all over 16 years) were students (23 per cent, 20 per cent and 17 per cent of the groups respectively reported making trips for education purposes) and therefore information about journeys to education establishments was obtained. As would be expected a vast majority individuals travel at least five times per week. Only the high income group have a notable number of individuals who travel less frequently for education purposes. The mean age of the high income group is slightly higher than that for the other groups. This fact, combined with the likelihood of this group having more disposable income, suggests that a higher number of the high income group attend night school, which involves expense, and is unlikely to involve travel more than twice per week.

Modal choice for education trips is shown in Figure 6. The distribution of modes is similar to that found for work trips.

A considerable number (59 per cent) of trips are undertaken by personal motor vehicle by the high income group, presumably due to parents giving a lift to other young adults. The bus is a popular mode with all three groups, but especially the low and mid income groups. The bicycle is predominantly used by the low income group. Mean journey distances are 6.7 km, 7.3 km and 10.5 km respectively.

Figure 6: Modal choice by income group; education trips



5.2.3 LOW INCOME HOUSEHOLDS: GENDER DIFFERENCES

The results from the household survey suggest that females are not often in a strong bargaining position when it comes to the utilisation of vehicles owned by the household. In addition, public opinion, tends to be against women using two-wheelers - the fastest growing transport mode (although these opinions are changing). Therefore one would expect the travel behaviour of men and women to differ.

5.2.3.1 Demographic differences

Table 6 shows the sex split of the low income group and shows mean age. It can be seen that more males than females were interviewed, but enough females responded to have confidence in the data. The men were, on average, slightly younger than the women, but this difference is not significant.

Table 6: Number and mean age of respondents

	Male	Female
Number of respondents	103	74
Mean age	34.6	37.8

5.2.3.2 General trip characteristics

Table 7 shows the mean trip rates for men and women. Men make significantly more return trips than women. The explanation is likely to be that men make more trips for work than women.

Table 7: Daily per capita trip rates

	Male	Female
Number of return trips per day	1.21	0.79

Figure 7 shows the modal choice (all trips) for men and women. Obvious differences exist; far fewer women use motorised two-wheelers and bicycles than men. Instead women make a higher proportion of trips by walking and by bus. Explanations for this are given in the subsequent sections.

Figure 7: Modal choice by sex; all trips

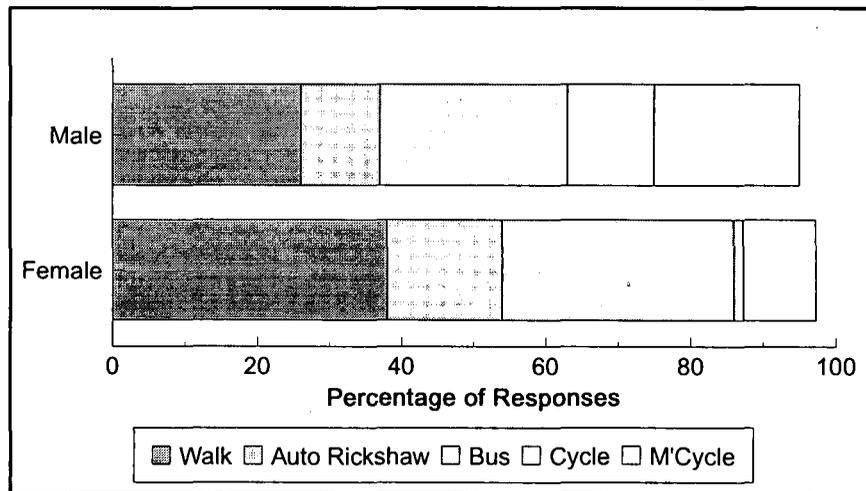


Table 8 gives the mean journey length by mode for the sexes. Men have marginally longer journeys than women by 0.5 km. This is mainly due to longer distances travelled by bus. For the other modes the two groups are fairly comparable.

Table 8: Mean journey length by mode

	Male	Female
Motorcycle/scooter	4.2	4.7
Bicycle	2.1	1.0
Public bus	8.4	7.2
Auto rickshaw	3.0	3.3
Walk	2.4	2.4
All modes	4.2	3.7

5.2.3.3 Work trips

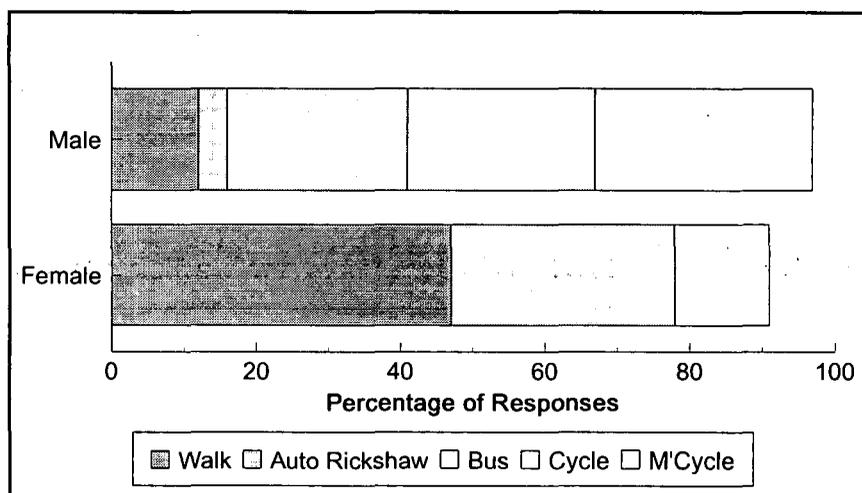
Frequency of making work trips is shown in Table 9. As one would expect the modal response for both males and females is working 'at least five times per week'. It is interesting to note that it is more common for women to work less than five times per week than men, which implies that more women are employed on a part-time basis. A much higher proportion of men than women make work trips: 68 per cent compared to 19 per cent. Thus from the sample it is evident that far fewer women than men are employed and so need to travel for such a purpose.

Table 9: Frequency of making work trips

	Male	Female
Five times or more	93%	83%
2-4 times per week	2%	3%
Once a week or less	5%	14%

Figure 8 illustrates considerable differences between the sexes in terms of modal choice.

Figure 8: Modal choice by sex; work trips



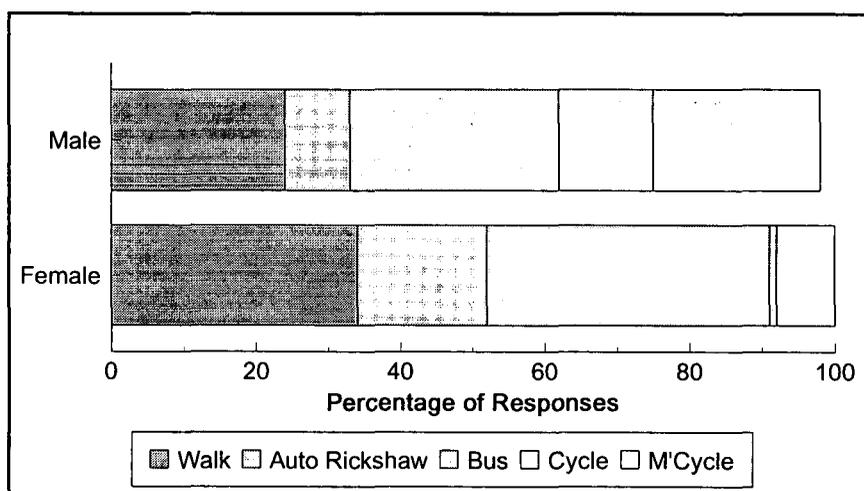
The modal mode for women is walking, whereas for men it is the motorcycle or scooter. This difference may be explained in part by the fact that the mean home to work journey is shorter for women than men (4.6 km compared to 6.5 km). However, there are obviously many women who travel considerable distances to work (the *mean* is 4.6 km). It would appear that these women take the bus rather than use a bicycle or motorised two-wheeler.

The difference in modal mode is likely to be for two reasons. Firstly, women tend not to have the same degree of access to family-owned vehicles as men. Secondly, women's perceptions of the safety of bicycles and two-wheelers tend to be lower than those of men (see Section 5.2.3.6). Therefore, even when a woman has access to such modes she may prefer to walk or catch a bus (although this may not be the case for affluent females).

5.2.3.4 Shopping trips

As for work trips, the two sexes demonstrate similar frequency patterns. Figure 9 shows modal choice for the two sexes. As with work trips, there are differences in modal choice.

Figure 9: Modal choice by sex; shopping trips



Unlike work trips, males and females have the same modal mode for shopping trips, namely the bus. Other than this, however, the patterns are largely the same as for work trips; more women than men travel by foot whereas men more frequently use a motorcycle/scooter.

Both sexes make more use of autorickshaws for shopping than for either work or education trips. This is likely to be due to a trade off between cost and frequency, and the convenience offered by the mode when needing to carry a heavy load. Males and females travel approximately the same distance for shopping trips, i.e. males 5.0 km and females 4.3 km.

5.2.3.5 Education trips

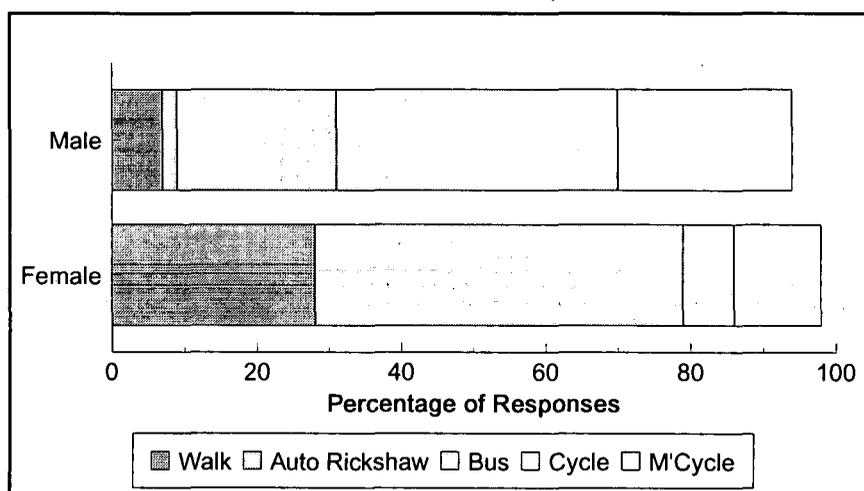
The frequency of making education trips is shown in Table 10. For males 21 per cent reported making education trips; for females 23 per cent.

Table 10: Frequency of making education trips

	Male	Female
Five times or more	82%	76%
2-4 times per week	4%	2%
Once a week or less	14%	12%

The pattern for the two sexes is similar. As with work and shopping trips, however, the pattern of modal choice differs. See Figure 10.

Figure 10: Modal choice by sex; education trips



The modal mode for females is the bus, whereas for men it is the bicycle. Few women (19 per cent) use either a bicycle or a motorised two-wheeler, whereas 63 per cent of men use one of these two modes. This reflects the pattern previously found, i.e. two-wheelers being less frequently used by women and more frequently used by men.

For education trips, males tend to travel slightly further than women (7.4 km compared to 6.0 km).

5.2.3.6 Attitudes towards private vehicles

Figure 11 shows the affirmative responses of males and females in relation to bicycles. Considerably more men than women ever make a journey by bicycle. In addition, men rate bicycles as being significantly safer and more comfortable than women.

Figure 12 shows the responses for motorcycles/scooters. Fewer men ride a motorised two-wheeler than ride a bicycle, whereas the opposite is true for women. Nevertheless, significantly more men ride a motorised two-wheeler than women. As previously mentioned, culture and public opinion have been against women riding two-wheelers, which may in part explain the finding. However, public opinion has been changing over time, and so in future one would expect an increase in the number of female two-wheeler users. Section 6 deals exclusively with women and two-wheeled transport.

Figure 11: Attitudes towards bicycles

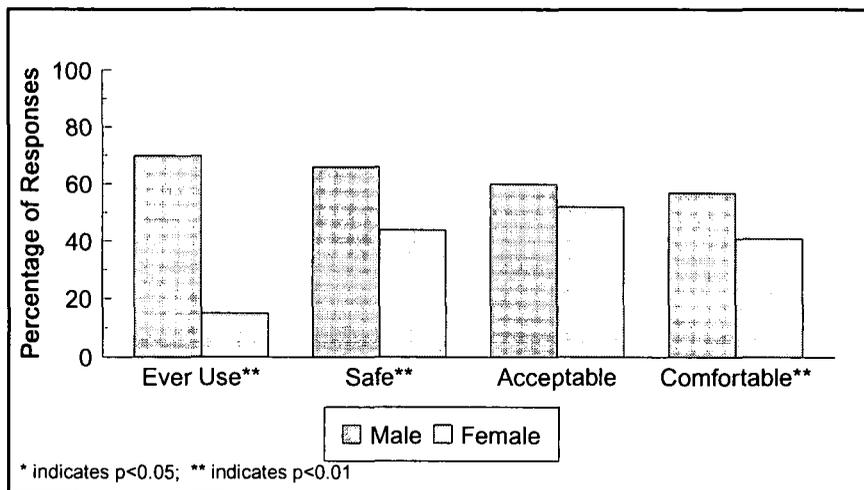
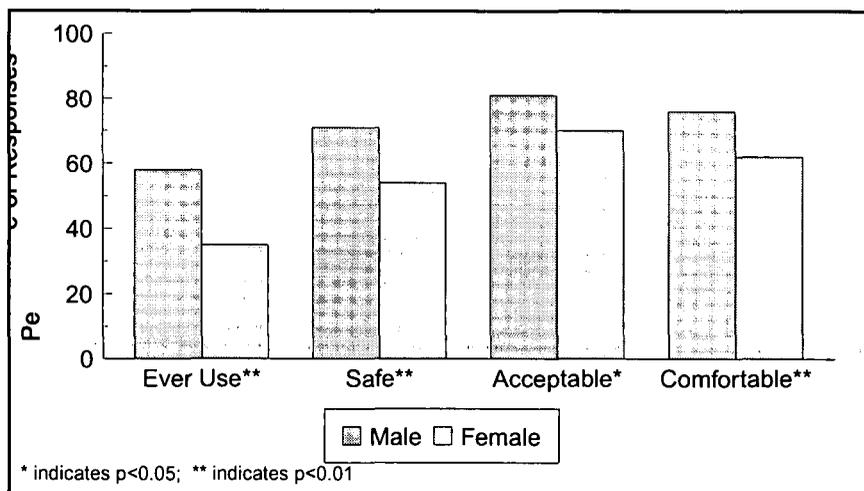


Figure 12: Attitudes towards motorcycles/scooters



Similar patterns exist for the other questions. Whilst women rate motorcycles/scooters more highly than they rate bicycles, men remain significantly more positive.

5.2.3.7 Attitudes towards public transport

Table 11 shows the complaints that males and females have about the use of public transport. The most interesting finding is that a higher proportion of women rate overcrowding as a problem. This is understandable since sexual harassment (known as 'Eve-teasing') is common on public transport vehicles.

Table 11: Problems of using public transport

	Male	Female
Overcrowding	28%	41%
Rude/cheating staff	5%	6%
Too expensive	1%	3%
Not enough buses/routes	14%	8%
Have to wait too long	25%	18%
Irregular	15%	19%
Other	12%	5%

Suggested improvements (see Table 12) are linked to perceived problems. It is of interest to note however that very few women want to see the introduction of female-only buses (as opposed to the very popular women-only carriages on trains). Instead of single-sex buses, women would like to simply see more buses operating, and therefore a more frequent service offered, thereby reducing the overcrowding which is so evident at times.

Table 12: Suggested improvements to public transport

	Male	Female
Improve regularity	45%	39%
Better staff behaviour	3%	5%
More buses	21%	32%
Improve punctuality	13%	11%
Make cheaper	3%	5%
Introduce female-only buses	-	2%
Other	15%	6%

6. WOMEN AND TWO WHEELED VEHICLES

6.1 INTRODUCTION

In many developing countries, bicycles have grown in popularity as a means of personal transport as they offer a relatively cheap form of travel once they have been purchased. As income levels rise however, cycles tend to be replaced by motorised two wheelers such as motorscooters, mopeds and motorcycles, particularly among middle income groups.

In Pune, females are increasingly using these forms of personal transport to travel; and it does not appear unusual for households in middle and higher income groups to have access to both a motorcycle (predominantly used by males) and a moped/motorscooter (for use by females).

Thus, females are now having a greater degree of personal freedom regarding travel. As they become less reliant on public transport, they should theoretically have increased accessibility and mobility to better employment opportunities as well as social, leisure and shopping facilities. In order to ascertain whether this hypothesis is correct, questionnaire surveys were carried out for a sample of female cyclists and moped/motorscooter users. Two hundred and four female bicyclists and 587 moped/motorscooter users were interviewed. The differences in sample sizes occurred because there were fewer female cyclists observed than moped/scooter users; however the sample sizes are large enough to be representative of the users and to allow statistical analysis.

6.2 PROFILES OF THE RESPONDENTS

6.2.1 AGE AND MARITAL STATUS

The mean age of motorscooter users at 28 is older than that for cyclists at 21. The difference maybe partially attributable to the fact that persons have to be over 18 years of age in order to be eligible for a motorscooter licence, but may also reflect a higher proportion of students among the cyclists than the motorscooter sample.

A large proportion of the respondents were single, though a higher proportion of motorscooter users (53 per cent) were married probably due to the fact that a larger percentage of the cyclists were below the current marriageable age of 18 years for females, though in practice this legal restriction is not always conformed to.

6.2.2 INCOME, EMPLOYMENT AND EDUCATION

The respondents were asked their occupation and salary. The results are shown in Table 13. Only 20 percent of the sample of cyclists were in paid employment compared to 60 percent of the motorscooter users (as stated previously, a large proportion of the cyclists were students). The income levels for the cyclists are relatively low suggesting that maybe a large number are in some form of part-time employment, possibly fitting in with their educational commitments. The mean monthly income of the cyclists was one third of that of the motorscooter users.

The mean cost of purchasing a vehicle was Rs 1275 for a bicycle and Rs 20115 for a moped/motorscooter. In general, female motorscooter users are more highly qualified than female cyclists and mean monthly income tends to reflect this.

TABLE 13: Occupation and monthly income

	Cyclists	Moped/Motorscooter users
Student	68.9%	35.3%
Housewife	9.8%	4.4%
Clerical/admin.	2.9%	9.1%
Tertiary	17.8	43.9%
Professional	-	6.4%
Other	0.6%	0.9%
Mean monthly income	Rs 1505	Rs 4540

6.2.3 ACCESS TO VEHICLES AND VEHICLE OWNERSHIP

Vehicle ownership is shown in Table 14. A larger proportion of the moped/motorscooters users than cyclists personally owned their vehicle. Also a much higher percentage of motorscooters than cycles were owned by the respondents' husbands (although, as stated previously, more motorscooter users were married than cyclists).

Table 14: Vehicle ownership

	Cyclists	Moped/Motorscooter users
Respondent	32.1%	38.8%
Husband	5.7%	21.1%
Family	62.2%	39.1%
Other	-	1.0%

Despite the fact that around two thirds of both samples replied that their vehicle was owned by husbands and other family members, over 90 percent of cyclists and 80 percent of the motorscooter users stated that they had access to the vehicle whenever they wanted it (see Table 15). Thus, the vehicles were only used by other family members when they were not required by the respondent. This appears to contradict the findings of section 5.2.3, which suggests that women take the bus or walk because men use the motorcycle/scooter. It is important to remember, however, that the two populations are different; Section 5.2.3 looked at all low-income members, whereas the present section concentrates on women who *actually ride* two-wheelers and thus are not subject to the same constraints. Other key users of the household owned vehicles include husbands, parents and brothers/sisters.

Table 15: Access to vehicle

	Cyclists	Scooter/Moped users
Whenever want it	28.2%	31.2%
Most of the time	63.0%	49.0%
Sometimes	6.6%	18.0%
Rarely	2.2%	1.8%

Table 16 shows other personal vehicles available to the household. The motorscooter users generally have more vehicles available within the household than the cyclists interviewed. They also have around double the number of motorised two wheelers and four times as many cars. This obviously reflects a greater degree of affluence of motorscooter users as illustrated in Table 13.

Table 16: Additional vehicles available to the household

Vehicle	Cyclists	Moped/Motorscooter users
Car	4.9%	21.5%
Other bicycle	46.6%	42.1%
Other motorised two wheeler	38.7%	63.5%

Note: Percentages add up to more than one hundred percent in the motorcycle users column because some households have access to more than one additional vehicle.

6.3 PUBLIC TRANSPORT USAGE

Around 75 percent of the female cyclists interviewed and 98 percent of motorscooter users also use public transport services to make journeys. The frequency with which these respondents use public transport is illustrated in Table 17. The motorscooter users tend to use public transport services "as required". This can cover a number of responses ranging from using public transport daily to once a year, but does suggest usage on a non-regular basis. This also suggests a greater degree of affluence among the motorscooter users as they can make use of public transport when they choose to do so. It is also possible that the respondents live in areas better served by public transport.

Table 17: Frequency of use of Public Transport

	Cyclists	Moped/Motorscooter users
Five times a week or more	-	2.8%
Two - four times a week	24.1%	7.1%
Once per week	22.7%	10.8%
Once per fortnight	12.1%	5.9%
Once per month	7.1%	8.0%
Less than once a month/occasionally	11.3%	5.9%
As required	22.7%	59.5%

Note: These are responses given by the cyclists and motorscooter users who stated that they used public transport to make journeys, and it includes trips by bus, train and auto rickshaw.

6.4 JOURNEY PURPOSE

When interviewed the main journey purpose for female motorscooter users was 'travelling to or from work', and for the cyclists it was for 'educational purposes' (see Table 18). A relatively small proportion of journeys being made at the time of interview for both samples was for 'shopping purposes'. The higher percentage of shopping trips undertaken by the motorscooter users may be accounted for by the fact that a larger proportion of these respondents are married and therefore the responsibility for buying food for the household is more likely to lie with them than in cases where the respondents are unmarried. In addition, the higher income of the motorscooter users may mean that they are more likely to undertake shopping as a leisure activity. Other activities using the two wheelers include social, medical and educational activities, the latter mainly by cyclists.

Table 18: Purpose of the trip being made

	Cyclists	Moped/Motorscooter users
Travelling to/from work	30.8%	46.5%
Shopping	8.7%	14.7%
Social	3.1%	2.6%
Medical	1.5%	3.9%
Education	48.2%	29.6%
Other	7.7%	2.7%

The benefits that the respondents perceive from using their vehicle rather than public transport are shown in Table 19. For female cyclists, the modal response was that it was cheaper. However, for the female motorscooter users the modal response was that "by using their vehicle they would save time", or "arrive at their destination on time." As stated previously, a large proportion of motorscooter users were making work journeys and therefore ensuring that they arrive on time is obviously important. Cost is clearly of marginal importance to motorcycle owners as opposed to comfort and convenience which are far more important.

Table 19: Benefits and disbenefits of using the vehicle (percent)

	Cyclists	Moped/ Motorscooter users
BENEFITS		
Time saving/arrive on time	9.8	51.4
Cost saving	51.6	6.5
Comfortable/easy to ride	17.4	24.0
Exercise	12.1	
Convenient	9.1	18.1
TOTAL PERCENT	100	100
TOTAL RESPONSES	132	691*
DISBENEFITS		
Unsafe	23.9	15.1
Not useful for long journeys	18.3	2.9
Tiring	18.3	
Time consuming	7.0	0.3
Uncomfortable	28.3	
Expensive to buy/operate and maintain		61.9
Traffic/parking problems		12.5
Other	4.2	7.3
Total percent	100	100
Total responses	142	344

*Some respondents gave more than one answer to this question.

Both sets of respondents thought that their own safety when using the vehicle was a major problem, but other than this cyclists and motorscooter users have very different concerns. For

the motorscooter users, the costs of buying, operating and maintaining the vehicle is a major issue, however, for the cyclists, this is not a reason for concern. Parking motorcycles is a major problem in the central area of Pune, however the major concern of cyclists is that cycles are uncomfortable, tiring to operate and not particularly suitable for long journeys, .

Although there are a number of disbenefits to using both cycles and motorscooters, the benefits must outweigh the disadvantages of making the journey by another mode of transport. Table 20 shows why the respondents chose to use their vehicle rather than public transport for the particular journey they were making when interviewed.

As Table 20 shows convenience is a major factor influencing the respondents decision to use their own vehicle. Comfort and savings in time are also key reasons for motorcycle owners.

Table 20: Reasons for not using public transport for this journey (percent)

	Cyclists	Moped/Motorscooter users
Own vehicle is convenient	30.5	29.1
PT expensive/cheaper to use own vehicle	22.4	4.3
PT offers irregular services/inconvenient	17.2	5.0
Own transport readily available	4.6	0.9
No waiting with own vehicle/saves time/ lengthy wait for PT	20.1	23.8
Easy to drive own vehicle	4.0	8.3
Comfortable	0.6	24.3
Safe	0.6	4.3
Total percentage	100	100
Total responses	174	703*

*Some respondents gave more than one answer to this question.

7 PUBLIC TRANSPORT PASSENGER SURVEY

7.1 INTRODUCTION

Due to the relatively low levels of personal transport ownership in developing countries, public transport is a major mode of travel for urban residents, but especially for the urban poor and females. In order to assess how effective public transport is in terms of meeting users' travel needs, questionnaire surveys were conducted of users of local stage bus and train services. These interviews were conducted either on board the bus/train or at bus stops/train stations. To ascertain whether males and females have different attitudes, needs and problems regarding public transport use, a sample of male and female passengers were interviewed and

their responses are compared in this Section.

7.2 USER PROFILES

7.2.1 AGE

On average, the bus passengers were older than train passengers; the mean age for the male and female sample of bus users being 30.7 and 31.5 respectively, compared to 28.1 and 26.2 for the train users. There were a much higher proportion of train users in the 21-30 age group compared to the bus users, and a much higher percentage of bus users in the 40 plus category.

7.2.2 EMPLOYMENT AND INCOME

A much higher proportion of train users are in paid employment (see Table 21) compared to the bus users; around 64 per cent of female bus users are either students or housewives/housepersons compared to around 44 per cent of train users. Thirty-one per cent of male bus passengers and 15 per cent of train passengers were either housepersons or students.

Table 21: Occupation

	Bus Passengers		Train Passengers	
	Male	Female	Male	Female
Student	26.4%	18.6%	14.9%	33.2%
Housewife/houseperson	4.2%	45.7%	-	12.4%
Clerical/admin.	2.1%	0.3%	-	-
Tertiary	56.8%	29.5%	85.1%	44.9%
Professional	2.8%	2.9%	-	1.1%
Secondary	2.8%	-	-	8.4%
Retired	4.9%	0.2%	-	-
Other	-	2.8%	-	-
Mean monthly income	Rs3109	Rs3384	Rs2569	Rs2293

Bus passengers have a higher mean income than train passengers. Trains are often used to make longer journeys, and in developing countries the urban poor tend to live a considerable distance from the city centre and therefore have to travel long distances into the centre. This may account for the lower mean income of train passengers compared to bus passengers.

Female bus users have a higher mean income than males. This may be because males with higher income levels are able to afford some form of motorised personal transport and therefore travel using their own vehicle. For females, issues such as safety are a consideration, and there maybe some constraint due to public opinion (though the strength of this seems to be decreasing). Conversely, the mean income of the male train users is higher

than that of the females. This is presumably because a much higher proportion of male than female train users were in paid employment.

Table 22 shows the purpose of the journey being made when the respondent was interviewed. The main journey purpose for all users was for employment. However, a higher proportion of males were making work journeys compared to females; around a third more male train passengers were making work journeys than females, and almost twice as many male bus passengers compared to females.

A large proportion of female bus passengers were housewives/housepersons. This probably accounts for the high percentage of female bus users making shopping trips.

Table 22: Journey purpose

	Bus Passengers		Train Passengers	
	Male	Female	Male	Female
Work	52.0%	28.1%	64.5%	46.9%
Shopping	7.3%	17.6%	0.0	8.9%
School	20.7%	13.6%	18.4%	29.6%
Social	4.0%	9.6%	-	1.6%
Recreation	3.3%	4.2%	-	0.5%
Hospital	4.7%	4.0%	-	1.6%
Religious	3.3%	7.6%	17.1%	3.6%
Other	4.7%	15.3%	-	7.3%

7.3 USER ATTITUDES TO BUS AND TRAIN SERVICES

The respondents were asked questions regarding their attitudes to a number of different features of public transport. They were asked to rate their responses on a 5 point scale ranging from "very good" to "very poor".

Male bus users were more inclined to give bus services a higher rating than females. For example, 32 per cent of male respondents stated that reliability was very good compared to 10 per cent of the female sample. Less than one per cent of females stated that overall the bus services were 'very good' compared to 9 per cent of males.

These ratings highlight the fact that the female respondents perceive or experience more problems using bus services than the male respondents. The women were particularly concerned by the behaviour of drivers/conductors and other passengers.

The attitudes of the female train passengers were similar to those of their bus counterparts in that they were concerned about the behaviour of drivers and other passengers. However, in contrast to female bus passengers, 40 per cent of the train users interviewed rated the behaviour of other passengers as 'very good' or 'good' (the corresponding figure for the bus

users was around 31 percent). This may be because on certain local train services females have access to female-only carriages, and are therefore segregated from males.

Female train users also rated the 'comfort' and 'convenience' of train services and the 'availability of connecting services' more highly than male respondents.

Overall, the female train users rated the service more highly than males. For example 55 per cent of females stated that overall, the train service was either 'very good' or 'good' compared to 1 per cent of male respondents. In contrast 97 per cent of males classified the service as being 'average' or 'poor' compared with 44 per cent of females.

8. SUMMARY AND CONCLUSIONS

The rapid development of Pune has led to substantial demand for travel both within the CBD and between residential areas and manufacturing centres. Despite a considerable expansion of public transport services, the fleet has not kept abreast of demand. In response to this many of the leading manufacturers in Pune now operate large fleets of buses (both chartered and privately owned) to ensure their workforce arrive on time and thus production is not interrupted.

With rising affluence, ownership of motorised two-wheelers has quadrupled in the last 15 years and as a consequence cycle usage has declined. The cycle network established during the 1980's is therefore shared by cyclists and riders of motorised two-wheelers. The bicycle however continues to be an important mode for students from the low- and mid-income households. The walk mode is frequently used in Pune. This is probably because distances travelled are relatively short. The walk mode may also be used because public transport is expensive for short distances, or walking to local centres is preferential to travelling by public transport to the city centre.

The survey findings illustrate that considerable differences exist between males and females in terms of access to and the use of the various travel modes on offer. Females are much more likely to walk or take the bus, and this may be linked to the types of journeys they make, e.g. local shopping trips and escorting children to school. Although such trips are essential for the 'survival' of the household, they are not wage earning, and thus are afforded less priority in terms of access to vehicles owned by the household.

In higher income households which own a number of vehicles, such constraints do not appear to exist. There has been a growth in the number of women riding two wheeled vehicles, usually motorscooters and mopeds. This suggests that attitudes and traditions are beginning to change. Social and economic changes are therefore making it both increasingly acceptable and increasingly affordable for females to have a greater degree of personal mobility and independence.

Women perceive the bus service in Pune to be inferior to the local train service in terms of convenience, comfort and safety. This is largely due to the existence of female-only carriages on the trains. Surprisingly, however, women appear disinterested in the idea of female-only buses (perhaps due to earlier unhappy experiences when sections of buses were caged for female security) and would prefer to see the provision of more buses. A higher service

frequency would as a consequence create a less crowded and safer environment in which all, but especially females can travel in comfort. More men than women classified the local train service as "average" or "poor".

Clearly, looking to the future, the public transport system needs to be continuously developed and the fleet increased to keep pace with the ever-growing size, travel needs and demands of the population. Women appear to favour the train over the bus. Restrictions in rail-route planning make it unlikely that the rail network will expand, and thus it is the bus fleet and route network which needs to be expanded. Low cost traffic management measures need to be planned and adopted to segregate and give priority to public transport vehicles wherever possible.

As incomes rise and attitudes change females are increasingly able to travel by moped or motorscooter. Thus the motorised two wheeler fleet in Pune is likely to grow substantially in the coming years. The road network needs to be planned accordingly.

The low income communities will continue to rely on inexpensive public transport services and travel on foot to meet their mobility requirements. The bicycle will continue to be an important means of personal transport for low income households for a number of years to come, though in low income households, females do not generally have access to the household bicycle and therefore usually walk.

The findings though specifically pertaining to Pune are likely to be relevant and applicable throughout urban India. It is therefore hoped that the results will provide transport administrators with a better understanding of travel behaviour and constraints faced by today's urban residents. Hopefully the findings will gradually enable the formulation of better transport development policies and informed decision making leading to improved accessibility and mobility allowing the sustainable economic and social development of urban communities.

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