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PROMOTING LOW CARBON TRANSPORT IN INDIA

Gender Sensitive Transport Planning for Cities in India

CEPT UNIVERSITY

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Darshini Mahadevia

Acronyms and Abbreviations

NMT	Non-Motorized Transport
UNEP	United Nations Environment Programme
LCT	Low-Carbon Transport
CEPT	Centre for Environmental Planning and Technology
GHG	Greenhouse Gases
NAPCC	National Action Plan for Climate Change
CO_2	Carbon Dioxide
MoEF	Ministry of Environment and Forests
GoI	Government of India
UDP	UNEP DTU Partnership
IIT-D	Indian Institute of Technology, Delhi
IIMA	Indian Institute of Management, Ahmedabad
USA	United States of America
UK	United Kingdom
MIG	Middle Income Group
LIG	Low Income Group
HIG	High Income Group
KM	Kilometer
sq km	Square Kilometer
UMTCL	Urban Mass Transit Company Limited
IPT	Intermediate Public Transport
MTW	Motorized Two-Wheelers

MFWs	Motorized Four-Wheelers
GVMC	Greater Visakhapatnam Municipal Corporation
BRTS	Bus Rapid Transit System
INR	Indian Rupees
Rs.	Rupees
NASVI	National Association of Street Vendors India
CBD	Central Business District
IT	Information Technology
NEN	North-East Network
NUTP	National Urban Transport Policy
CMP	City Mobility Plan
JNNURM	Jawaharlal Nehru National Urban Renewal Mission
TOD	Transit Oriented Development
GPS	Global Positioning System
CCTV	Closed-Circuit television
MoUD	Ministry of Urban Development

Executive Summary

Mobility and gender inequality are important issues that must be factored into disucssions on low carbon transport in India. Indian women and low-income groups still generally have very low mobility, which is detrimental to their participation in the labour market and keeps them from making the most of life's opportunities. In Indian cities, a large percentage of women walk to get to where they need to go. As their income increases they shift to public transport, but this is often either unavailable or inefficient in terms of frequency and reach. Women in low-income households face the worst mobility situation, as not only do they have limited financial resources and capacities, but they also lack time, energy, and safety. Affordable, dependable and safe transportation options would encourage both gender equity and sustainable, low-carbon transport. The pathway to this sustainable, equitable future must integrate well-designed NMT infrastructure, especially for walking. Affordability is also important, because women avoid expensive public transport systems. The system must also be efficient to appeal to women with little time to spare. Finally, safety is crucial, not only in terms of reducing accidents, but in regards to protecting women from sexual harassment and attack. These transport options will work only in the context of mixed land use and heterogeneous neighbourhoods where women do not need to travel long distances to get to work and other activities. Low carbon transport options that take these issues into consideration will reduce urban women's carbon footprint while increasing their mobility, making it possible for them to benefit from life's opportunities.

Photo credit: Sarath KT (Centre for Urban Equity)

1. Introduction

1.1 Background

India is currently the world's fourth largest emitter of greenhouse gases (GHGs). Since the transport sector accounts for 13 per cent of India's energy-related CO_2 emissions,[1] addressing transport issues opens up opportunities for mitigating GHG emissions. By aligning development and climate change objectives, India can make its transport growth more sustainable and climate compatible. As noted in India's National Action Plan for Climate Change (NAPCC), GHG emissions from transport can be reduced by adopting combination of sustainable measures such as encouraging public transport use, accelerating adoption of biofuels, and enhancing energy efficiency in vehicles.[2]

This document is a product of the Promoting Low Carbon Transport in India (LTC) project, a UNEP initiative. The key objectives of the LCT project are as follows:

a) Creating an enabling environment for coordinating policies at the national level to achieve a sustainable transport system.

b) Enhancing cities' capacity to both improve mobility and lower CO_2 emissions.

The project was designed to focus on mobility that is inclusive, i.e., transport modes that address the needs of all socioeconomic groups. In a review of work on inclusiveness, the project's steering committee recommended studying the mobility patterns of women. This report focuses on the mobility patterns and constraints of women in general, as well as those of low-income groups. The real challenge is to expand the women's mobility in Indian cities, while maintaining women's low ecological footprint in terms of transport.

The LCT project has been endorsed by the Ministry of Environment and Forests (MoEF), Government of India, and is jointly implemented by the UNEP DTU Partnership, Denmark (UDP); Indian Institute of Technology, Delhi (IIT-D); Indian Institute of Management, Ahmedabad (IIMA); and CEPT University, Ahmedabad.

1.2 Why a Gender Perspective in Urban Transport

Sustainable and inclusive transport has very strong gender dimension. Typically, gender is overlooked in transport planning, in spite of the long standing acknowledgment that "women and men experience cities in different ways."[3] Women's interests and needs have been underrepresented in urban policy and development, including transport. This is largely due to a gender-blind approach to urban development in India that is overwhelmingly oriented towards infrastructure and real estate projects, with little or no understanding of who uses these projects them and whether their benefits are equal for men and women.

Mobility is crucial to women's empowerment, helping them both to access opportunities and to challenge constraints imposed by the all-pervading patriarchy. Moreover, in low-income households, women's

mobility enhances access to jobs, thereby increasing their family's chances of escaping poverty. In many countries, both developed and developing, women are abandoning traditional domestic roles and entering the work force, educational institutions and public life, either to follow their dreams or to improve their economic situation. Whatever may be the inspiration, a lack of affordable and convenient transport options continues to hinder many women in achieving these goals.

In recent decades, women's mobility has improved both in India and around the world. While the distance travelled per capita has increased for women since the 1980s, they remain constrained by their social roles within families,[4] which perpetuate dualism and multi-tasking in their lives. While this phenomenon has been largely observed in developed countries in North America and Europe,[5] developing countries such as India are also seeing this phenomenon in cities. Increasing women's mobility implies revising transport policies to suit women's travel behaviour and needs.

Studies have shown that women's travel needs are different than men's in both private and public transport.[6] There are also gender differences in mobility within the urban space.[7] In developing countries, gender differences in mobility needs are very pronounced, requiring gender-sensitive policy responses. Gender relations shape mobility, and mobility shapes gender relations.[8] This report argues that this dialectic relationship requires a breakthrough in the form of policy intervention.

Photo credit: Sarath KT (Centre for Urban Equity)

2. Gender and Women's Needs

What is gender? The terms 'gender' and 'women' tend to be used interchangeably, but they have different meanings. The term *women* refers to the biological differentiation between femaleness and maleness, and hence is biologically constructed. The term gender refers to "culturally-mediated expectations and roles associated with masculinity and femininity."[9] This term infers that conditions and needs vary between women and men not due to any biological difference, but rather to socially constructed conditions and behaviours which place different gender roles on members of each group.

Gender roles are shaped by economic, cultural and social norms and therefore women's needs are not homogenous. While gender roles play a significant part in constructing unequal urban realities for women, their needs are also shaped by other facets of their identity. Multidimensional elements of social life such as class, caste, religion, ethnicity, age, sexual orientation and physical (dis)ability define gender in intersection with the biological difference of sex. As such, "gender concerns need to reflect the rights and needs of women not only as 'women' but as representatives of diverse constituencies including informal sector workers, domestic workers, care givers, evicted people, homeless, migrants, etc."[10] The tendency to universalize women's needs should be mediated through comprehensive, inclusive outreach to better understand how these identities might inform urban development goals.

Women living in cities often face the greatest challenges, not only because they are, "on average poorer than men…but also often because they experience greater difficulty in accessing resources and services tailored to their needs, and decision-making opportunities."[11] Studies of transport, housing, infrastructure access, etc. demonstrate these inequalities. "The increase in women-headed households in cities everywhere, and the growing phenomenon of women-maintained families, make it even more necessary to adopt a gender perspective in responses to urban poverty."[12]

2.1 Triple Role of Women

The triple role of women is a central element that underpins theories of gender and development. This triple role can also be understood as a gendered division of labour.[13] Unlike men, women typically perform three separate but equally essential roles, between which they must divide their time. The first of these triple roles is *reproductive work*, which includes tasks such as childbearing and rearing, as well as household tasks and responsibilities. Women also do *productive work*. Whether inside the home or out, many women work and contribute secondary, or even primary income to their households. Finally, many women are also engaged in *community management work*, which entails the provision of items of collective consumption, in both rural and urban communities alike. In the urban context, women of low-income communities manage many shelter security programmes. Urban conditions can make the completion of any one of these roles more difficult, limiting the amount of time they may dedicate to their other two roles. Despite these challenges, the triple role of women is not typically taken into account in mainstream planning and policies.

Since women bear children, they are assigned the task of domestic work and are also the primary caregivers in the family, while men are assigned the role of primary wage earners for the family. If women

engage with the labour market or assume a public role, it is over and above fulfilling their role as nurturers, caregivers and managers of the domestic sphere, limiting their participation in productive work. They are permanently multi-tasking, juggling home and work responsibilities. In developing countries, women spend large amounts of time performing household work, reducing time available for productive work.[14] For this reason, women prefer to travel to urban destinations that allow them to multitask. Low-income women who need to work to increase household income tend to find work close to home and walk to work. They may travel longer distances for work if affordable transport allows them to do so. If the work place is far and affordable transport is not available, they are forced to walk, making them 'no choice walkers.' Walking long distances requires these women to spend valuable time as well as energy, contributing to their time poverty.[15]

2.2 Practical and Strategic Gender Needs

Multiple roles reduce women's mobility, physical as well as economic. This engenders diverse and complex needs for women that are different from those of men. Molyneux[16] has classified these needs as practical or strategic. Practical gender needs address immediate concerns and necessities. As their name suggests, they are practical in nature and aim to improve inadequacies in living and working conditions. Strategic gender needs, on the other hand, address systematic and structural conditions that contribute to women's subordinate position in society. Transport and mobility have an important role to play not only in helping to meet women's practical needs, such as access to maternal healthcare, but also in contributing to the strategic empowerment of women by promoting access to employment and socio-political advancement.[17] Furthermore, women's travel patterns and needs are mediated by class and, in case of India, caste and religion-based differentials. Oftentimes, the line between the practical and strategic needs may not be explicit. Other times, what is initially a practical need may evolve over time to address a strategic need as well.

Photo credit: Sarath KT (Centre for Urban Equity)

3. Gender Influencing Mobility

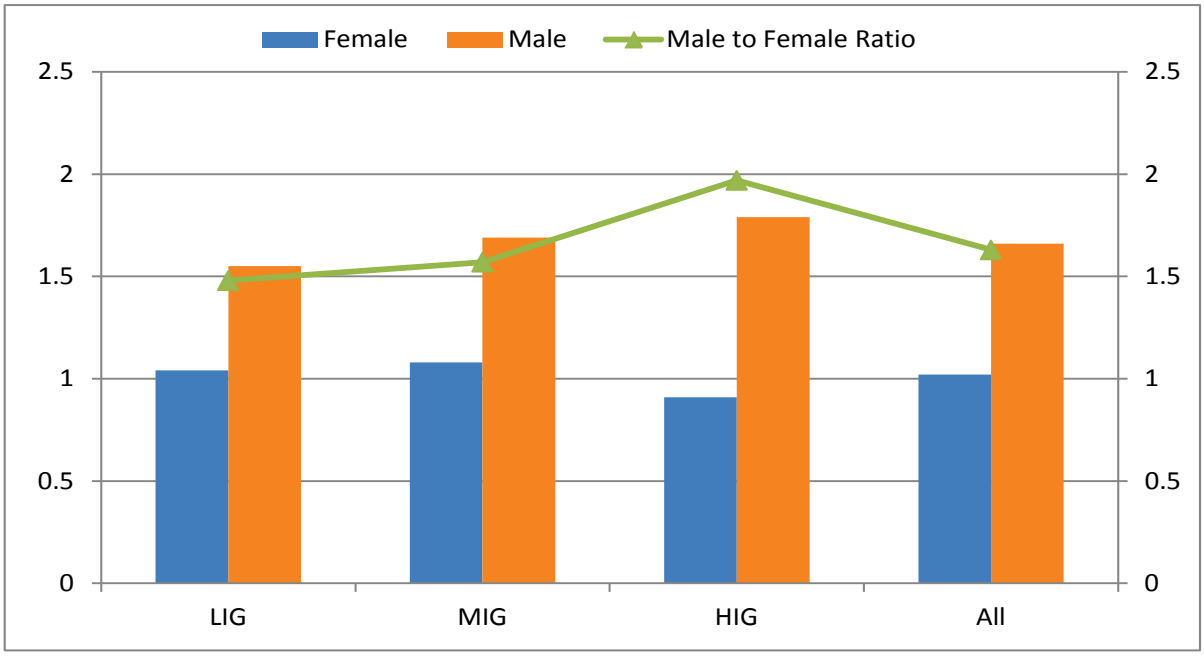
In this section, information is drawn from literature on how gender has influenced women's mobility in general, using specifics from certain cities in India, and primary data from Rajkot, a mid-sized Indian city. Some of the influences discussed here apply to women in general; wherever possible, differences are highlighted between developed and developing countries, income groups and other social groups.

3.1 Women Do Not Undertake Frequent and Long Travel in Cities

Multiple roles and multi-tasking leads to women juggling home and away, paid and unpaid work responsibilities, and their activities tend to be tied to the household.[18] This creates situations wherein women tend to stay in particular localities. They tend to make shorter trips than men, in particular those related to work.[19] In the United Kingdom, data shows[20] that the total distance travelled by women in all modes was far less than that of men. It also showed that when driving private cars, women drove fewer kilometres than men.[21] In developed countries, women are less likely to take work that involves extreme commuting, defined as a commute of more than 90 minutes.[22] In a developing country such as India, women tend to use two-wheelers, which are the primary type of privately-owned vehicles. For example, in Pune city,[23] a study showed that in households with two-wheelers, women used them as needed, although their daily trip rate was much lower (0.79) than men (1.21). However, given the supply-side barriers to supporting mobility and improving accessibility, coupled with the ongoing process of pushing low-income households to cities' peripheries, the poor, including poor women, are sometimes forced to commute long distances.[24]

In a Rajkot[25], a mid-sized city in Gujarat, interesting travel patterns can be observed after disaggregting data by sex and income class.[26] On the whole, the trip rates and lengths were low in Rajkot, as the city's diameter is about 20 kms. But those rates were even lower among women in all three income groups that were analyzed (Figures 3.1 and 3.3). Women of the Middle Income Group (MIG) had the highest trip rate among the three income groups, followed by the Low Income Group (LIG) and then the High Income Group (HIG). LIG women need to go out of the house to work, but make short trips, some of which might not be considered as a trip in the study. As the incomes increase, Indian women tend to drop out of the labour market[27] and thus women in the HIG group do not need to make as many trips as women in the MIG and LIG groups. In Rajkot, 54 per cent of LIG women made a trip every day as compared to 45 per cent of HIG women.

Figure 3.1: Trip rates by income class and gender differential ratio in trip rates in Rajkot



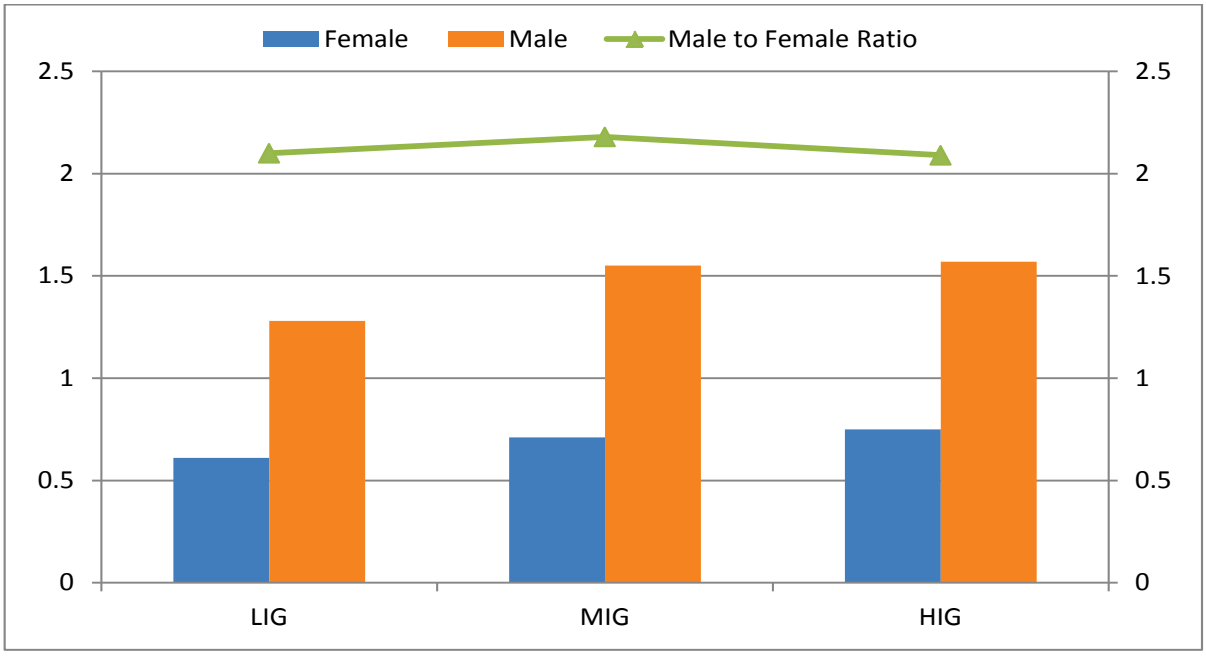
Note:
LIG = Per capita income less than or equal to INR 2,500 per month
MIG = Per capita income between INR 2,501 to INR 5,000 per month
HIG = Per capita income of more than INR 5,000 month per month.

Source: Data extracted from primary survey.[28]

In contrast, the household tends to remain poor if the men do not participate in the labour force. In Rajkot, 84 per cent of HIG males made a trip as compared to 78 per cent of LIG males. Thus, there is a male-female disparity in the trip rate that is highest among the HIG group and lowest among the LIG group (Figure 3.2). Household income determines both women's trip rates and gender inequality, with more MIG and LIG women making a daily trip as compared to HIG women, and more HIG and MIG men making a daily trip as compared to LIG men. Thus, in Rajkot, gender inequality in trip rates is the highest in the HIG group as compared to the LIG group.

In Udaipur, another Indian city, women have a lower trip rate than men (Figure 3.2). While Rajkot is an industrial city, Udaipur is a tourist city, with a population of about about 0.6 million in 2011.[29] The city's small size explains the low trip rates for women in Udaipur; Udaipur is only 37 sq km while Rajkot is 170 sq km. Even male trip rates in Udaipur are lower than that of males in Rajkot. Thus, the necessity of a trip in Udaipur is low and many short walking trips might not be considered a trip. Gender inequity in trip rate is higher in Udaipur than in Rajkot, and unlike Rajkot, the least inequity is in the HIG group. Thus, while gender inequity may vary with household income, overall, women in each income class have lower trip rates than men in both cities.

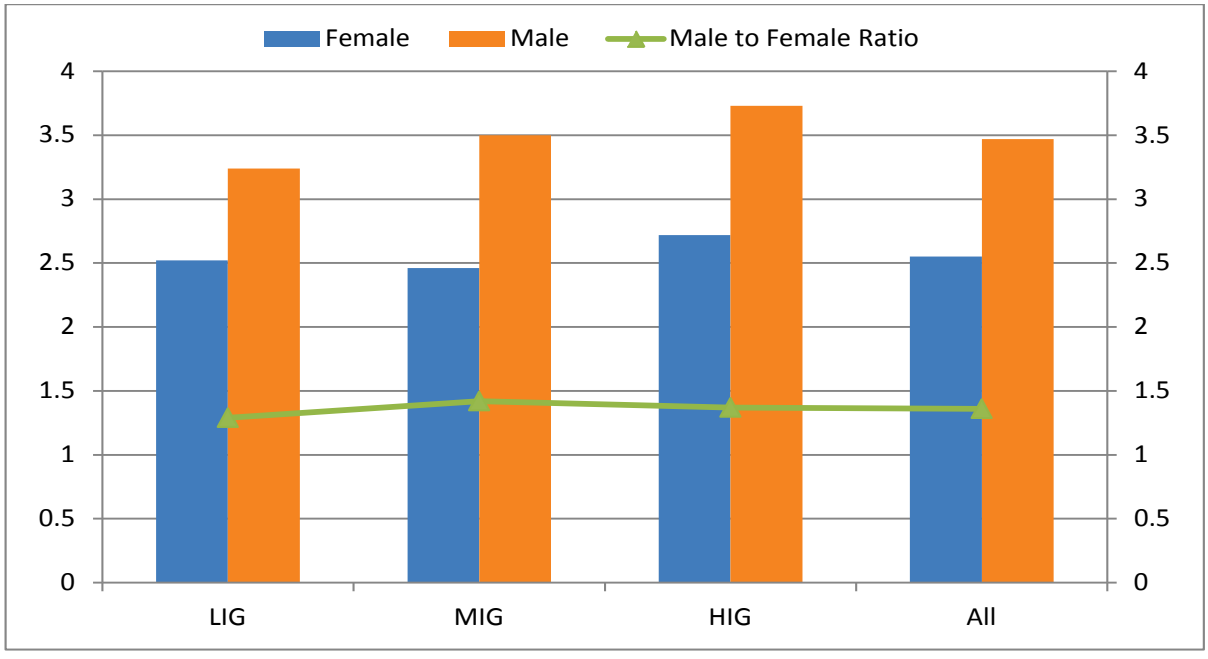
Figure 3.2: Trip rates by income class and gender differential ratio in trip rates in Udaipur



Note: Trip rate includes walk mode

Source: UMTCL.[30]

Figure 3.3: Average trip length by income class and gender differential ratio in average trip length in Rajkot



Source: Data extracted from primary survey[31]

While women's Average Trip Length (ATL) in each income class is lower than that of men in Rajkot (Figure 3.3), women's ATL increased with income. The LIG women's average trip length was 2.52 km, while that of HIG had an average trip length of 2.72 km. The corresponding figures for males were 3.24 km and 3.73 km respectively. Unlike men, the rate of increase of women's trip length in relation to increased income could not be observed. On the contrary, the gender inequality in trip length increased with increase in income; that is, in the HIG group gender inequality in the trip length was higher than in the LIG group. The male to female trip length ratio for LIG was 1.29, which increased to 1.37 for HIG (Chart 6). Thus, even with increased income, women's mobility increases at lower rate than that of the men, primarily, as shown further down, due to women's mode choice options.

3.2 Diverse and Multi-Purpose Trips than by Men

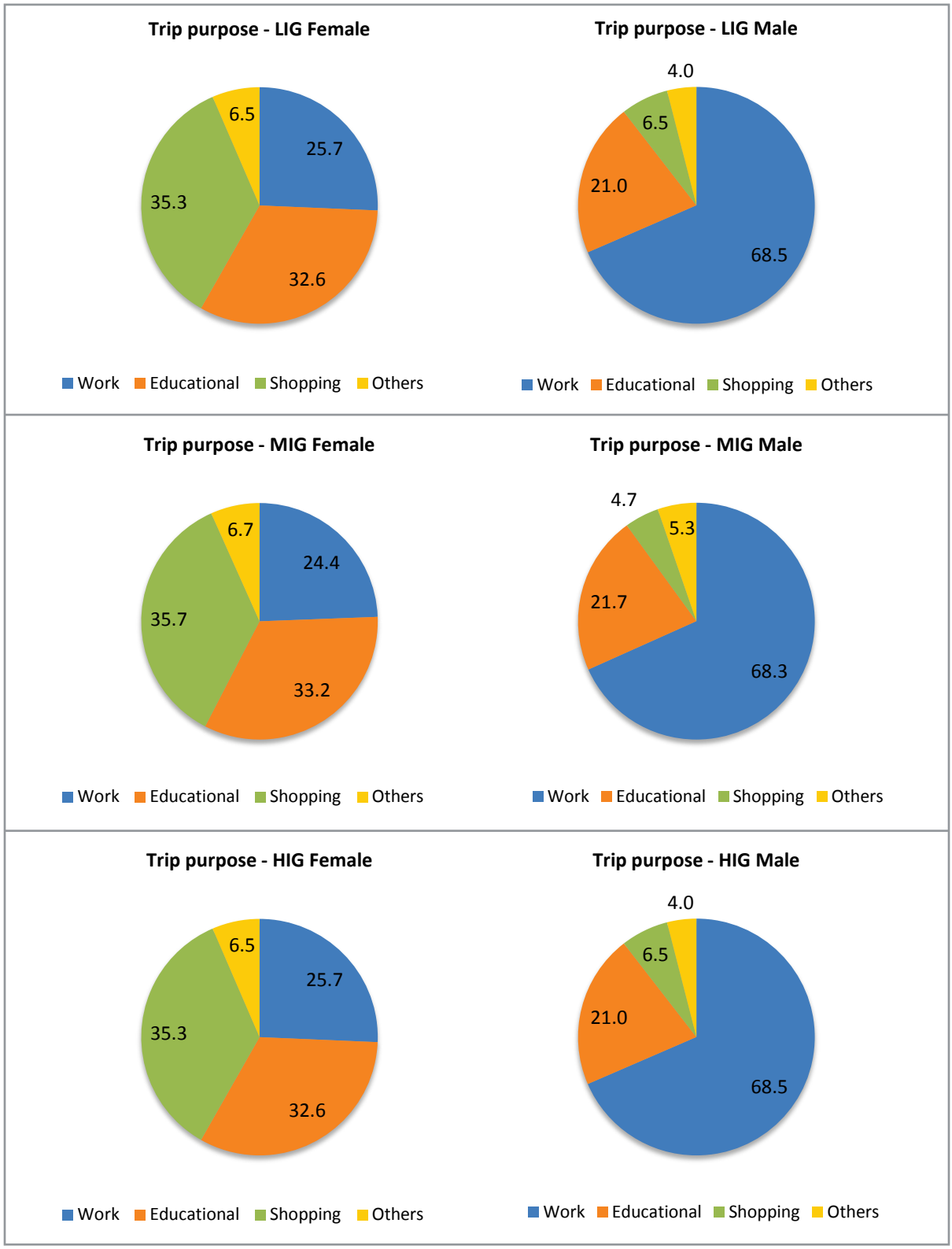
Women tend to make more complicated trips,[32] or take multipurpose trips, or engage in 'trip chaining,'[33] i.e., taking many sub-trips in one main trip. For example, in a study in the USA, two-thirds of women stopped once on the way home from work and 25 per cent stopped more than once.[34] Women also make more non-work related trips than men.[35] They take trips related to household needs and also take passengers, usually children whom they are escorting.[36] Women tended to make more 'escort trips' than men, for example bringing children to school. In the UK, women made 65 per cent more of this type of trip than men in the 1994-96 period.[37] Thus, women prefer transport modes that allow for flexible, multipurpose trips. While women are more likely to go to schools, day-care centres and shops, men are more likely to go to bars and restaurants. However, these behaviours may change with cultural change.

In Rajkot, men tend to make more work related trips, whereas women make multipurpose trips. The work participation rate for women in the city is about 10 per cent, far lower than that of men, which is 58 per cent.[38] More than two-thirds of men made a trip for work reasons, while only about a quarter of women did so. Shopping seemed to be the largest proportion of trips (38 per cent) made by women in the city, followed by education trips (32 per cent). Hence, women registered short trip lengths because three quarters of them were not making longer work trips, but were mostly making shorter trips for shopping or education. The second highest trip purpose by men was education (21 per cent). Just 5 per cent of men made a trip solely for shopping.

Income differential in trip purpose is more apparent among women than among men (Figure 3.4). Marginally higher proportions of LIG women made work trips as compared to HIG women, whereas MIG women made the lowest work related trips in Rajkot. The proportion of women making trips for shopping did not change much across income classes. The MIG women made higher proportion of shopping trips as compared to LIG and HIG women.

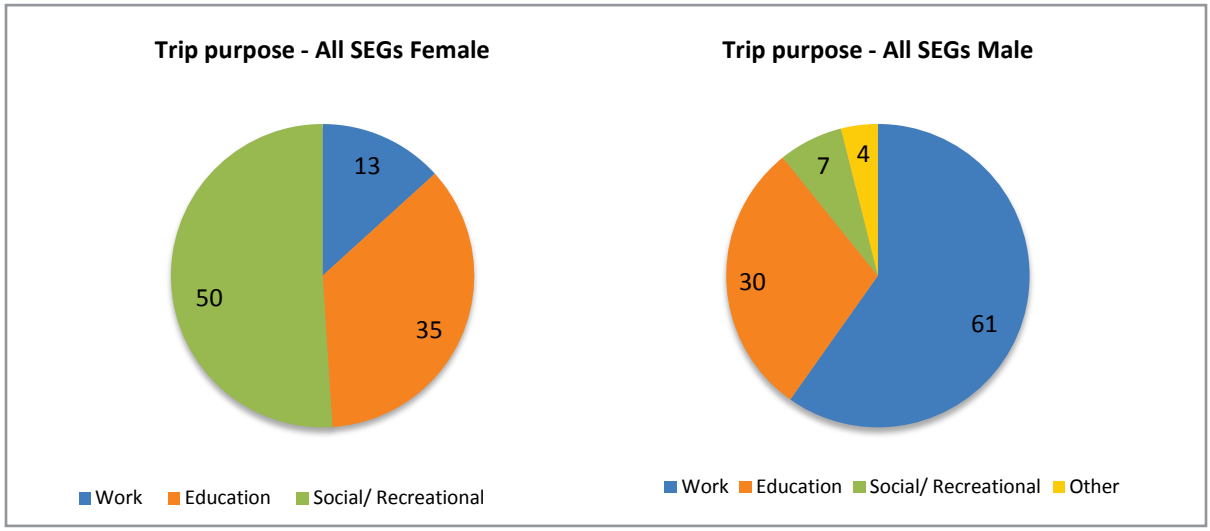
Data from another Indian city, Vishakhapatnam, shows very different trip purposes than in Rajkot, for both men and women. Among men, 61 per cent made work-related trips, followed by education related trips (30 per cent), while in Rajkot, these figures were 68 per cent and 21 per cent respectively. Among women, just 13 per cent made work related trip (Figure 3.4), while in Rajkot, this figure was about 25 per cent. There was similarity in the proporiton of trips by women for education in both the cities: 33 per cent in Rajkot and 35 per cent in Vishakhapatnam. Further, in Vishakhapatnam the highest trip purpose was for men work (61 per cent) while just 13 per cent of women made any trip for work (Figure 3.4). The proportion was slightly higher among women (35 per cent) than among men (30 per cent) for education-related trips. Even in Rajkot, the share of education trips was higher among women than men. In both cities, this was because more than three-fourths of the men's trips were for work purposes. Social and recreational trips, which could also include shopping, were half the total trips made by women in Vishakhapatnam.

Figure 3.4: Trip purposes by income classes and gender in Rajkot



Source: Data extracted from primary survey[39]

Figure 3.5: Trip purposes by gender in Vishakhapatnam



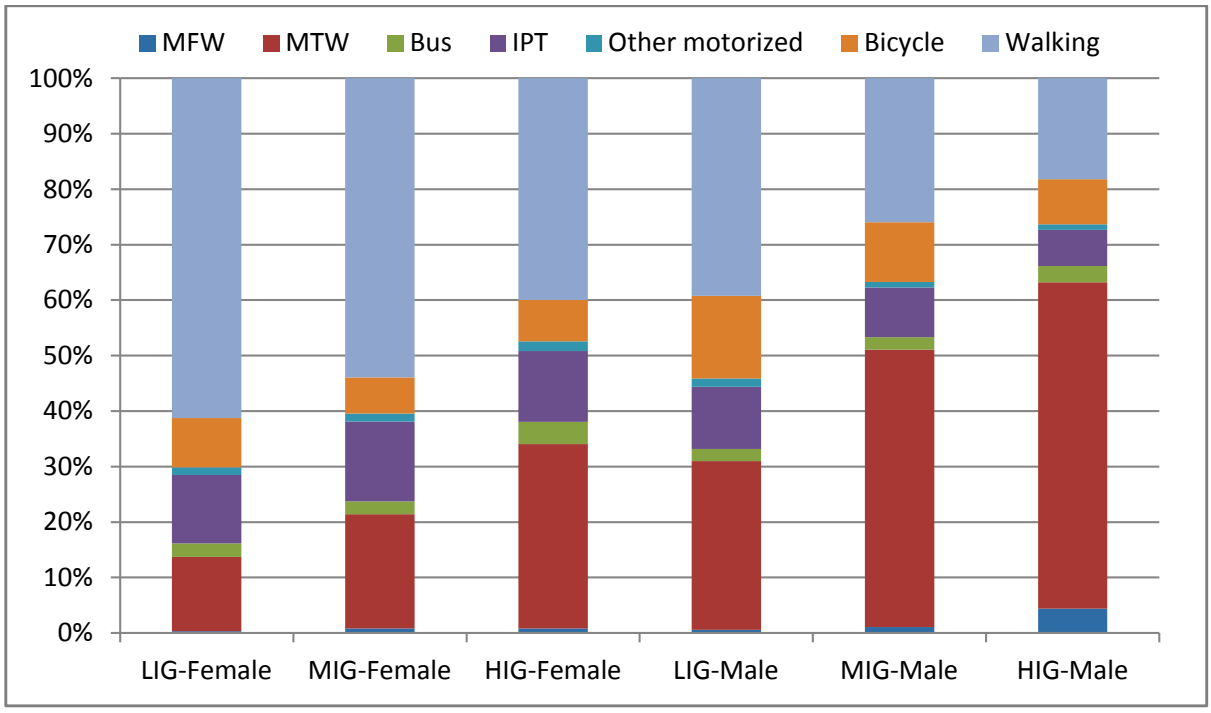
Source: Arora.[40]

3.3 Mode Choice

Women also make different modal choices. When it is available, women tend to use more public transport[41] and less private cars. In situations where public transport is not available or inadequate, as is the case in many cities in developing countries, women use para-transit, or Intermediate Public Transport (IPT) more than men.[42] For short distances, a larger proportion of women than men travel on foot, particularly in developing countries.[43] This means that women end up spending more time travelling, which creates a time-poverty situation.[44] Women generally attempt to find work at locations that only require a short travel distance, but this is not always possible. Women's mobility may be sustainable, but but it offers low accessibility, leading to lower capabilities, functionings, freedom, opportunities and choices.

Once again, mode choice is influenced by income class. A clear gender inequity is observed in mode choice; as income increases in Rajkot, both men and women tend to shift away from NMT modes such as walking and cycling towards private motorized vehicles, namely Motorized Two Wheelers (MTW) and Motorized Four Wheelers (MFWs). However, as income increases, more men shift to private motorized vehicles than women. Walking continues to remain a dominant mode for women's mobility despite income increase. (See Figure 3.6). At the same time, the ratio of female to male use of MTWs increased with income from 0.44 in LIG to 0.57 in HIG.

Figure 3.6: Mode choice by gender and income class in Rajkot



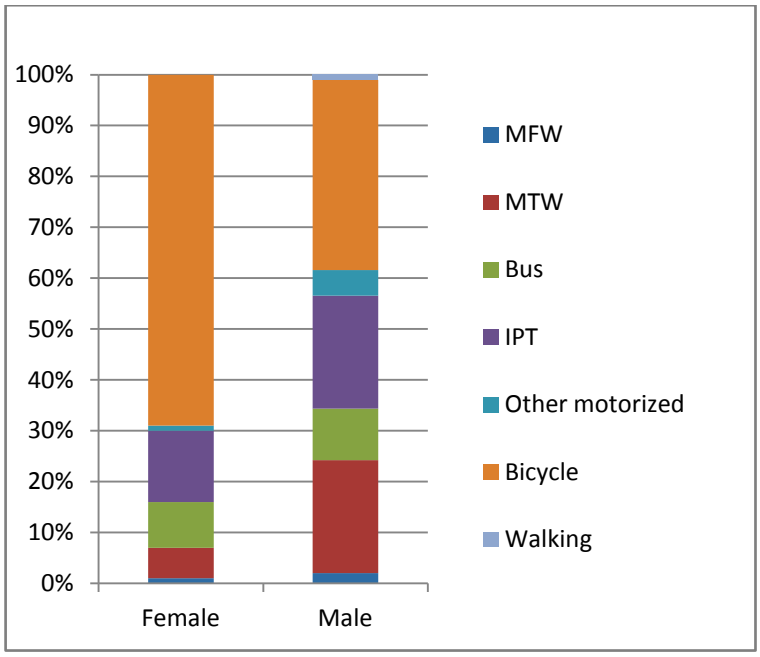
Note:
MFW = Motorized Four Wheelers; MTW = Motorized Two Wheelers;
IPT = Largely autorickshaws

Source: Data extracted from primary survey.[45]

Rajkot being a mid-sized city, the predominant motorized mode is two-wheelers, which are used by both men and women, though more men than women use them in the same income class. The modal share of buses in Rajkot is low, as the city did not have any bus-based public transit system at the time of study. As a result, most people used IPT instead of public transit.

Women walk, and many continue to walk, regardless of their income class. In HIG, 40 per cent of women walked while just 18 per cent of men walked in Rajkot. In MIG, 54 per cent of women walked whereas 26 per cent of men walked. In LIG, three in every five women walked and nearly two in every five among men walked. Thus, walking was the most prominent mode among low-income women in this city. The ratio females to males walking was 1.57 for LIG, which in fact, increased to 2.08 for MIG and was the highest at 2.20 for HIG. This implies that with an increase in household income, there is a shift towards private motorized vehicles by men and a shift towards public transport by women. In small sized cities, where walking is a practical option, women's transition to using motorized personal vehicles is slow. The study also indicates higher gender disparity in modal use in high-income households as compared to low-income ones.

Figure 3.7: Mode choice by gender in Vishakhapatnam



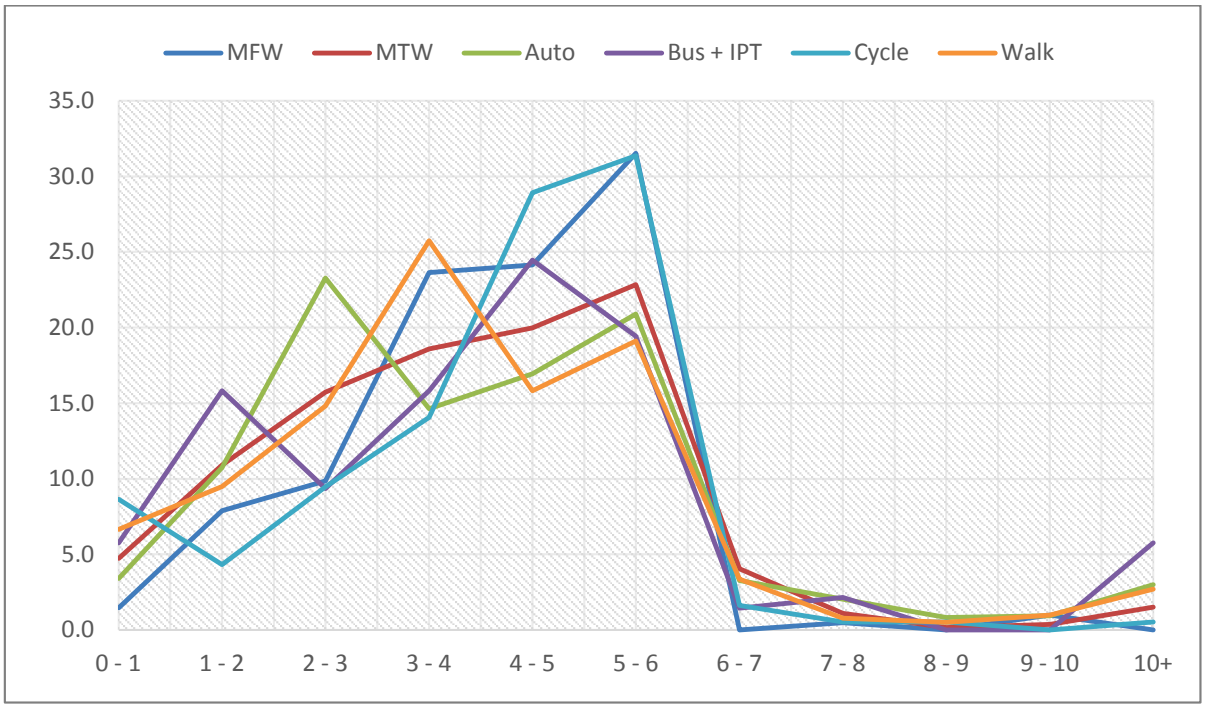
Source: Arora.[46]

The trip mode shares also vary by city size, with one aspect in common; most women walk more than men, while more men use motorized vehicles. Vishakhapatnam[47] is a city with large geographic spread (534 km^2 area in the Greater Visakhapatnam Municipal Corporation)[48] and low density (only 3,333 persons per sq km)[49], and has a a bus-based public transit system. In this city, 14 per cent of women and 22 per cent of men used buses (Figure 3.7). Commuting longer distances requires motorized transport and the bus is an affordable option. Rajkot had higher private motorized vehicle ownership, which resulted in 45 per cent men and 21 per cent women using MTW, whereas these proportions in Vishakhapatnam were just 22 per cent and 6 per cent respectively. Use of MFW was the same in both the cities. Despite Vishakhapatnam's large spread, walking was the predominant mode among women: 69 per cent for women as compared to 37 per cent for men. In Rajkot, 61 per cent women walked and 40 per cent men walked. Cycling was very low in Vishakhapatnam while in Rajkot 12 per cent men and 8 per cent women cycled.

The major difference between the two cities was higher public transport use in Vishakhapatnam and higher private transport use (motorized and NMT-cycle) in Rajkot, primarily because the former had a public transport system while the latter did not. Also, Vishakhapatnam is spread out and Rajkot is compact. This shows that the supply side of transport matters in mode choice: in cities with public transit supply there is lower dependence on private motorized transport, which can be beneficial to women, particularly in middle and high income groups.

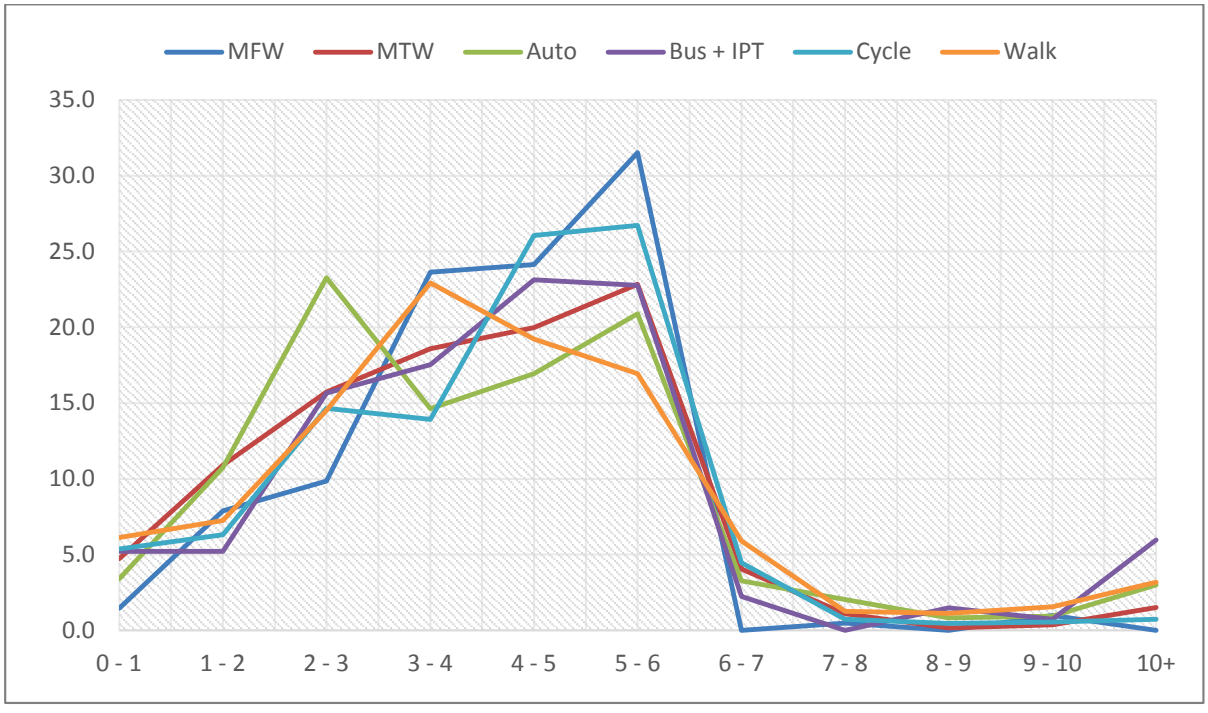
The proportion of trips for each mode by distance covered have been plotted for Rajkot (see Figure 3.8 for women and Figure 3.9 for men). On the whole, there were very few trips by women that were longer than 7 kms by any mode. There were hardly any trips by bicycle or foot over 7 kms, though there were some by bus and shared IPT. For women, walking trips peaked at 4 km, while those by MTW and MFW peaked at 6 km distance. For men, trips by MTW, MFW and cycle peaked at 6 kms and at 7 kms, after which the proportion of trips by all the modes started declining except by bus and IPT.

Figure 3.8: Distribution of all trips made by women by distance in Rajkot



Source: Data extracted from primary survey.[50]

Figure 3.9: Distribution of all trips made by men by distance in Rajkot



Source: Data extracted from primary survey.[51]

3.4 Lack of Vehicle Ownership by Women

In general, women to own fewer motorized vehicles than men. This is true in both developed countries and developing countries such as India. In Germany more men than women own cars and among households with cars, fewer women than men held driving licence.[52] In car-based mobility systems, fewer women drove cars.[53] The data from Rajkot and Vishakhapatnam presented in earlier in this section also proves that the use of motorized vehicles by women in the both cities is low. In Rajkot, motor vehicle use is lower for LIG women than HIG women, which indicates that women also own fewer motorized vehicles.

3.5 Higher Dependency on Public Transit and IPT than Men

Women also tend to depend more on mass transit than men. In many contexts, including India, mass transit is more unreliable, more inconvenient and more inflexible than private vehicles.[54] It also makes women vulnerable regarding security issues. As women tend to value security when they travel, if the commute is not safe, they will travel less frequently.[55]

In general, including in India, public transport and its IPT substitute are used more by women than by men. This was the case in all the three income classes in Rajkot. In LIG, 16 per cent of females used this mode, as opposed to 15 per cent of males. The proportion of women using public transport increased with income class; hence in MIG 18 per cent and in HIG 19 per cent women used public or IPT. The figures for males were 12 per cent and 11 per cent respectively, indicating that as income increased, men shifted to private motorized transport. Low-income women could not afford even public transport or IPT and thus tend to walk. The use of public or IPT by women was possible only when the household incomes increase. This was observed in Rajkot. The ratio of female to male in use of public transport/ IPT was low in LIG, at 1.07, which increased to 1.46 in MIG and to 1.72 in HIG.

Figure 3.10: A woman choosing an ill-maintained trekker, an IPT mode over a bus in Guwahati, 2014

Photo credit: Centre for Urban Equity.

Figure 3.11: Women outnumber men at a public bus stop in Ahmedabad, 2015

Photo credit: Centre for Urban Equity.

Figure 3.12: People boarding a Tata Ace, an IPT mode in Bhopal, 2015

Photo credit: Centre for Urban Equity.

In Vishakhapatnam, where (bus-based) public transit is available, 22 per cent men and 14 per cent of women use this transport mode. Since 69 per cent women in Vishakhapatnam walk, the second highest mode choice for them was the bus. For men in Vishakhapatnam, 22 per cent used MTW, whereas only 6 per cent of the city's women used this mode.

3.6 Culture and Travel Behaviour

In certain cultures, women do not travel on their own without a male escort. In most cultures, women loitering in the streets is not accepted, nor is taking a trip without a specific purpose, which keeps women's trip rates low as compared to men. In a study of Mumbai, a relatively women-friendly city, the researchers write: "Narrative of respectability for women is woven around the urban, young, middle class, educated, able-bodied, Hindu, upper caste, heterosexual, married or marriageable, and one who are the bearer of all moral and cultural values that define family, community and nation."[56] Thus, women's moving out in public spaces has to appear as purposeful, as in going to work, carrying purchases or children, or moving from one place to another. Women have to be 'decently' dressed; it is often assumed that women invite harassment or rape due to their 'inviting' way of dressing. They are expected to wear markers of respectability such as *mangalsutra* (a marriage necklace), and controlled body language. These beliefs are also internalized by the women themselves.[57]

Cultural factors also influence women's choice of travel mode and purpose.[58] In certain communities, women are not allowed to go out in public to work. Such women have very low mobility needs. They also tend to work out of the home. Women's clothing in certain cultures does not permit them to ride bicycles, which is also true in Indian cities. Women in certain cultures also do not like to sit close to or touch male passengers, and thus use special women-only services such as women-only buses or women-only passenger wagons on trains. If these services are not available, these women will not travel by public transport, and thus their mobility options are restricted. In Indian cities, constant cultural barriers and safety concerns reduce women's ability to enter the public space.

Often, there are not strong gender differences regarding transport within an ethnic group, as studies in American cities have shown.[59] These studies also show smaller gender differences between those who commuted by public transit and those who use private cars.[60] In the North American context, some studies have also shown that there were no gender differences in regards to distances for work trips.[61]

As the Rajkot data (Figure 3.6) shows above, cycling is not an option for women who could not afford to take IPT or private vehicles. Just 9 per cent of LIG women cycled, compared to 15 per cent of LIG men in Rajkot. The traditional attire for Indian women, the *saree*, does not allow them to cycle. It is not only uncomfortable but also unsafe to cycle wearing a *saree*. Further, male road users' misogynist behaviour and harrassment of women cyclists further discourages women from cycling in cities. Thus, in Rajkot, a very low proportion of women use bicycles for transport, even in the LIG group.

3.7 Lack of Mobility Pushes Women to Take up Home-Based Work

Women are more likely to work at home than men, even in the US context.[62] In developing countries, even more probable, as studies of Ahmedabad[63] show. In Indian cities, 26.7 per cent of all women workers are self-employed and work out of their home; the proportion of males is 7.0 per cent.[64]

Figure 3.13: Home based workers in Ahmedabad

Photo credit: Centre for Urban Equity.

Box 1: Transport and Home-Based Workers

Public transport costs have increased in Ahmedabad, and potential users find the prices unaffordable. In a survey of the city's home-based workers, certain participants who were relocated to peripheral areas under public housing programmes stated that they had either no or poor public transport facilities. Transport costs have increased for these workers, causing disruption in practicing their livelihood. They were spending about 16 per cent of their income on transport for procuring raw materials. Some of them had taken to sending their children, mainly boys, on bicycles to procure raw materials. Many began to get work from a middlemen, who then gave them low piece rates for the home-based work. Also, there were less work orders than when they were living in the city centre. Those who were employed in the city center prior to resettlement dropped out of the workforce, shifting to home-based work to avoid transport costs and the hardships of poor public transport facilities.

Source: Mahadevia et al (2014).[65]

Figure 3.14: Ubiquitous shared autorickshaws at a peripheral resettlement site, Ahmedabad

Photo credit: Centre for Urban Equity.

Figure 3.15: Autorickshaws – the only way to get out of informal periurban settlement of 25,000 households, Ahmedabad

Photo credit: Sarath KT (Centre for Urban Equity)

3.8 Even Public Transit May Exclude Women

Although women are highly dependent on public transport and stand to benefit from its provision, a lot depends upon the pricing and routing of the public transit system. A study of the Bus Rapid Transit System (BRTS) in Ahmedabad in 2012 showed that only 27.5 per cent of the system's users were women.[66] Moreover, the number of users whose income was less than INR 5,000 per month was quite low (Table 3.1). The sex ratio (number of females per 1000 males) was very low (244) among the BRTS users in this income group. Among the high income group users (income above INR 40,000 per month), the sex ratio was 585, indicating that when income of the household increases, women tend to use public transport, even if it is relatively expensive. At the time of this survey, the BRTS ticket prices in Ahmedabad were higher than that of older bus-based public transist system, which also provided destination-to-destination connectivity while the BRTS provided direction connectivity. Hence, a segment of the low-income groups had not shifted to using BRTS from the older public bus system.

Table 3.1: Gender break-down of BRTS users, Ahmedabad

	Indicators	Male	Female	Sex ratio
	Income groups of the users			
1	% among users with income less than Rs. 5,000 pm	14.4	11.5	244
2	% among users with income more than Rs. 40,000 pm	10.9	16.8	585
	Age group			
3	% among users in age group 15-40 years	75.9	73.8	369
	Employment			
4	% workers among BRT users	71.8	42.7	226
5	% among users who are casually employed	6.1	3.3	121
6	% among users regularly employed in public sector	8.1	18.0	500
7	% among users regularly employed in private sector	63.8	65.6	232
	Trip purpose			
8	% using BRT for work	55.4	35.0	239
9	% using BRT for education	15.8	19.6	471

Source: Based on Mahadevia et al (2012).[67]

Across all segments of BRTS user groups, the sex ratios were quite low (Table 3.1). For example, in the age-group 15-40 years, the sex ratio was 369. Among those casually employed, a segment that has high incidence of poverty, the sex ratio was lowest, at 121. Also, among those using BRTS for work purposes, the sex ratio was 239. But, women used BRTS for their travel for education purposes where the sex ratio was 471. Thus, even when public transit is provided, its connectivity, network reach and pricing determine whether women use it or not.

Photo credit: Sarath KT (Centre for Urban Equity)

4. Mobility Influencing Gender

Mobility signifies movement of people from one place to another in the course of everyday life. Everyday mobility is fundamental for livelihoods, family life and community life. It forms an important aspect of '*Woman's Quest for Freedom*', as described by Willard in her 1895 book titled *A Wheel within a Wheel*.[68] In the book, she sees the ability to ride bicycle (which she learned at the age of 53), as a symbol of mobility and freedom, one that allowed her to travel for long distance on her own, giving her an exhilarating feeling of confidence and accomplishment, a sense of expanded possibilities, aspirations and personal growth, and also an escape from wearing 'womanly dresses.'[69]

As the example from Willard shows, mobility both shapes gender relations and provides opportunities. Mobility also influences social justice by enhancing capabilities.[70] Transport facilities are essential for accessing many services, and more importantly, the job market.[71] Public transport can also create social capital.[72] In the context of social justice, scholars expanded Sen's[73] capability approach to include notions of quality of life, opportunities, functionings, alternatives and freedom for individuals.[74]

Women's right to the city can be claimed when they are able to move freely in the city, either for the purpose of going from one place to another (mobility) or for the simple right to loiter without encumbrances emanating from culture and economic spheres. Freedom is "expanding women's access to public space ... (and) also … transforming women's relationship with the city and re-envisioning citizenship in more inclusive terms."[75]

Transport enhances functionings (various things that people do or can do), such as accessing needs and wants, accessing work, travelling for meeting people, etc. Transport also enhances capabilities by increasing mobility, both physical and social. Opportunities are described as what people can have given their capabilities, and transport can expand these opportunities by increasing accessibility to choices in life. As discussed above, transport provides mobility, which itself is a great freedom, and even more so for women and disempowered populations. Lastly, a good transport system provides choices. This is a major constraint in the developing countries where individuals from low-income households, and in particular women, are 'no-choice' cyclists or walkers, limiting their capabilities and functionings, and by that their opportunities and freedom. The gender question in transport therefore has to be located in this philosophical realm.

Photo credit: Sarath KT (Centre for Urban Equity)

5. Low-Income Women's Mobility Issues

In general, women's overall mobility is constrained due to accessibility options at the city level, the paradigm of transport development, violence and fear of violence and patriarchy that puts dual responsibility on women of domestic and economic spheres. The women in low income communities suffer not only from this mobility constraint but also the additional burden of poverty.

The urban poor in developing countries are trapped in a vicious cycle of poverty. Their low incomes lead to lower ability to afford housing and they end up in distant locations, on the outskirts of the city. Especially in large cities, women face constrained mobility. Even if they are located in the central parts of the city, they often live in informal housing and are at risk of often frequent evictions.

Peripheral living is also caused by displacement due to municipal development projects. Studies reveal that this resettlement this leads to women dropping out of the labour market, pushing households below the poverty line.[76] This is due to the fact that the resettlement sites do not have affordable transport systems, if they have them at all, and women, as seen above, do not usually own private vehicles. Also, in absence of public transport, informal para-transit may not be safe. After resettlement, especially when they are dumped on the city periphery, households often do not have access to water supply and sanitation, which increases women's work burden and hence their household time overhead, reducing time available for remunerated work.

One study of differences in travel behaviour between the two low-income settlements in Chennai in different locations (one near the city centre and the other on the periphery) shows that the residents living in the settlement on the periphery were making more work related trips than any other trip (63 per cent trips were work related, whereas in the central city slum 51 per cent trips were work related).[77] Peripheral location also entailed more time spent commuting, and women from the peripheral settlement spent even more time commuting than the men of the centrally located slum. Half the women in both the locations did not spend anything on transport and were largely walking to their work or other activities.

Residents in the centrally located settlement were more likely to use NMT modes for travel (walk or bicycle) than the peripherally located residents who were dependent on the irregular and crowed bus-based public transit. In both locations, women's major trips were by NMT; 88 per cent in the centrally located slum, and 73 per cent in the peripheral slum.[78] Location appears to be a significant determinant of travel behaviour of the low-income residents of Chennai who had few transportation choices. Lack of affordability meant that the number of trips were fewer from the peripheral slum as compared to the centrally located one. While women made fewer trips than men in both the slums, in the central slum fewer women (24 per cent) made two trips when in the peripheral slum 56 per cent of women made two trips. The average trip rate of women in the peripheral slum was 1.1 whereas in the central slum was 2.2.[79] Ninety five per cent households surveyed in both the slums stated that the cost of bus fare, overcrowding, poor bus frequency, poor sidewalks, pedestrian safety and accidents were their major concerns.

Figure 5.1: A low income woman walking on the carriageway putting herself at risk of accident

Photo credit: Centre for Urban Equity.

Figure 5.2: A group of women walking on the carriageway in the absence of footpaths at great risk

Photo credit: Centre for Urban Equity.

Walking is predominant among low-income women. In Delhi,[80] considerable differences exist between males and females of low-income households in terms of access to and the use of various travel modes. Females were much more likely to walk (52 per cent of women versus 26 per cent of men) or take the bus (43 per cent of females versus 42 per cent of males), and this may be linked to the types of journeys they made, e.g. local shopping trips and escorting children to school. While men cycled (26 per cent of them), women did not (only 5 per cent cycled).

Box 2: Urban Poor Women's Travel Behaviour – Case of Ahmedabad

A study of 10 low-income settlements in Ahmedabad City[81] found that while 62 per cent of all trips by settlement residents were by NMT, 67 per cent women and 56 per cent men used NMT for their trips; 65 per cent women walked while only 34 per cent men walked and another 22 per cent men cycled. Only 1 per cent women used MTW while 6 per cent men used this mode. Women travelled shorter distances than men; average trip length for all the trips for women was 3.2 kms and for men was 5.3 kms, but for regular trips such as work trips, women travelled on an average 2.9 kms and men travelled 5.1 kms. An earlier study by the local government in 2006 had arrived at 5.5 km as average trip length in the city, which is low. Low-income men's average trip length was the same as that of the whole city, but for women of this class the legnth was far shorter.

Being forced to walk, low-income women do not take work at distant locations. In Delhi,[82] low-income women were forced to work within a 5 km radius while 75 per cent of males worked within a 12 km radius of their homes. All women did not take work that required them to travel for more than one hour, while 89 per cent men did so. Lack of affordable transport access therefore was detrimental to the possibility of improving their work quality and income.

Women in poor households carry a higher burden of unpaid work, which is largely drudgery. With limited time spent on human capital, they enter the labour market at lower end, and hence tend to have lower earnings. This leads to their lower ability to pay for transport and in short, they tend to walk to work. The households do not invest as much in women as they do in men, thus women tend to have a lower level of human capital formation than men. This is more true for low-income households than high-income ones.

The journey to work may be long, as the poor may opt for low-cost and hence often slow transport modes, in case they cannot walk to work. If the the slow transport modes are not frequent enough, which is often the case, the poor tend to spend a lot of time waiting. The poor therefore are also "time-poor." Needless to say, women are more time poor than men.

Time is a major asset for the poor, who often have no others. Hirway argues[83] that to understand poverty, it is very important to have insights into how the poor use their time or how they are forced to use their time to address its multiple deprivations,[84] its nature and what needs to be done to intervene for poverty reduction. There are two major components of time that are responsible for perpetuating poverty in women: (i) the unfavourable allocation of time, such as time allocated for acquiring basic necessities and subsistence livelihood, e.g gathering food, fuel, fodder and water, and (ii) time stress leading to fatigue and less time allocated for human capital formation. The former keeps the poor and women from participating in productive work and leaves less time for capacity building and social networking for accessing higher income. Poor households tend to have higher household time overhead (time spent for basic chores for household survival) than the non-poor and among them, women tend to have higher household time overhead than the men, reducing time available for productive work.[85] In these situations,

if a transport system imposes 'travel-time overhead,' there is a consequential impact on a woman's ability to participate in productive activities and to increase her capabilities, not to mention additional fatigue and health impacts. Lack of time also leads to perpetuation of household poverty.

Because low-income women are forced to make walking trips while their nutritional levels are low,[86] they are also energy poor. Continuing high infant mortality rates in India are attributed to energy and nutrition deficiency among women, particularly poor women who have lower than ideal body mass index.

Lastly, walking or cycling on crowded roads without any pedestrian or bicycle infrastructure is unsafe. In many cities, women cannot walk on deserted roads or less trafficked roads, or even roads with only motorized vehicles, because of safety concerns. Hence, one could say that there is a 'safety poverty' among low income women. This transport deprivation is exacerbated by the process of forced eviction and relocation of low-income households to the periphery of the city.

Box 3: Gender, Poverty and Transport Linkages

Socio-economic aspect	Linkage with transport
Income poverty	Lack of access to work for women exacerbates income poverty
Expenditure	Transport expenses crowd out other expenditures in household budgets, often pushing women to walk long distances and compromise their health and education
Lack of capabilities	Lack of access to social services is a deterrent to improving capabilities, more so for women than men
Lack of functioning	Due to lack of access to employment opportunities, health care, education, etc. This is more pronounced for women in a patriarchal set-up
Time poverty	Due to inappropriate transport paradigm, which emphasizes mobility but not accessibility and causes fatigue and unfavorable time allocation for women, who are either forced to walk or wait for cheap public transport if available
Energy poverty	Caused by the need to walk long distances due to unaffordable transport options
Safety poverty	Caused by to lack of safe walking and cycling infrastructure, which also impacts access to and from public transit

In general, most cities in India have mixed land use and hence low trip lengths, especially for women. Also, low-income populations tend to live in informal housing with access to central city areas to reach their jobs. However, as elsewhere in the world, this situation is changing in India due to transformations in the transport paradigm, as well as urban development driven by real estate markets. As discussed above, the poor are often pushed to peripheral urban areas. Combined with sprawl, the journey time to work has increased in many cities, particularly for the poor. For example, in Mexico City, 20 per cent of the workers spend more than 3 hours commuting every day, and 10 per cent spend even more than 5 hours every day.[87] A National Association of Street Vendors India (NASVI) study of the hawkers in Mumbai

shows that they have long working days. Hawkers living in working class areas work from 10:00 am to 8:30 pm and those living in the suburbs from 9:00 am till 10:00 pm and spend between an hour and an hour and half commuting one-way.[88] In short, due to urban structure, land markets, land use and transport systems, the poor tend to spend long hours on the road commuting or waiting for transport, and suffering disproportionately from an environmental, security and safety point of view. While motorized vehicle trips in poor countries are restricted to the richest 20 per cent of the population,[89] the journey purposes of the poor are restricted, primarily to work.

According to a 1998 study on 7 large cities in South Africa, the legacy of apartheid has resulted in long distances between work and home for large sectors of the population. The average distance travelled by black South Africans living in townships to work in the central business district was about 28 kms.[90] The situation is similar in Brazilian cities, where the poor have been pushed out to inexpensive locations 30 to 40 km from the employment centre, resulting in an average daily commute of three hours for the poorest populations.[91] Recently, efforts have been made to improve this situation through the introduction of public transit systems in Brazilian and Colombian cities, including Bus Rapid Transit systems. This evolution towards public transit solutions for peri-urban areas is like to have a positive impact on women.

Photo credit: Sarath KT (Centre for Urban Equity)

6. Women's Safety in Transport

Women's safety in cities has become an important political issue in India today, and there is consensus on the issue across political, class, caste and religious divides. The issue was highlighted during elections held in both 2014 and 2015. After the brutal gang rape and murder of a young woman on a private bus line in Delhi in December 2012, there was a massive mobilization and new political awareness about the importance of safe transport in Indian cities. This report examines the issue from women's point of view, focusing on protection from sexual harassment. Though road safety issues related to accidents and pollution are also very important, they will not be discussed here.

Mobility via public transport or IPT requires women to negotiate the public spaces where transport facilities are located. Using public transport involves entering the public space, walking down streets and roads to and from bus stops, and waiting at those bus stops. As a significant proportion of public transport and all of ITP are unregulated and unmonitored, there are risks associated with the drivers of these transport modes, as demonstrated in the rape and murder of the young woman on a bus in Delhi mentioned above. In 2005, an IT professional in Bangalore was raped by a taxi driver who ferried IT company employees, while in Delhi, a professional was assaulted by the driver of a Uber taxi in 2014. In 2013 in Hyderabad, and in 2015 in Bangalore, two young women suffered the same fate: waiting for a bus that did not come, each was offered a lift by a passing taxi driver late in the evening, and were gang-raped by the driver and his friends. Women's safety is compromised not just by the transport mode, but also by the transport service providers themselves.

Figure 6.1: A woman boarding a public transport bus in Pune at risk of falling

Photo credit: Centre for Urban Equity.

Figure 6.2: Unpaved and ill-serviced streets in a peripheral resettlement site in Ahmedabad

Photo credit: Sarath KT (Centre for Urban Equity)

There is also a class issue. HIG women take their own motorized transport and their risk to sexual harassment and violence is far lower than that of the essentially low-income women taking public transport or IPT. In low-income neighbourhoods, just walking to the public transport or IPT stops often means walking through unsafe areas where alcohol and drugs are sold and used. The threat to women is much higher late at night when inebriated men are in the street or loitering in front of bars or drug dens. Streets are poorly lit, making women feel even more insecure after dark. Gender Safety Audits are now being promoted in many Indian cities. This movement has been pioneered by Jagori, a women's organization in Delhi.

Box 4: Women's Safety Studies

Jagori's 2006 study on transport and women's safety in Delhi conducted a survey of women living in the city and reported the following:[92]

- 74 per cent stated that violence took place in broad day light
- 50 per cent stated that roads are the most unsafe public space
- 39 per cent stated that public transport is the most unsafe public spaces

Another study by Jagori in 2010[93] found:

- Isolated areas, such as pedestrian underpasses or deserted streets were considered particularly unsafe places where women feared being robbed or raped
- An experience common to all women in Delhi was harassment while using public transport. In particular, buses were considered one of the least safe places for women in the city, a place where sexual harassment has become a regular occurrence
- High-income women avoid travelling in buses, using their private vehicle or a taxi when possible

After a young girl was molested in full view of the public in the centre of Guwahati in 2012, North-East Network (NEN)[94] conducted a survey of 1,045 women in Guwahati on their safety in public places. The survey found:

- Women claimed that while there was greater fear of assault or rape and in deserted spaces, men also took advantage the crush of people to sexually harass women in crowded spaces
- 39 per cent felt unsafe in public transport
- 49 per cent stated that they faced sexual harassment on roads

Experience of or fear of sexual harassment in transit, particularly on public transit or IPT, was attributed to many factors, including patriarchal values, poor enforcement of law and order, lack of street planning and design, and above all, lack of appropriate public transport planning.

Photo credit: Sarath KT (Centre for Urban Equity)

7. Other Issues

7.1 Lack of Data

Mainstreaming gender in transportation planning requires travel behaviour data disaggregated by sex for each income class, caste, religion and ethnic group. This data should be collected at the city level or at the macro level. However, as of the publication of this report, there is no city level or national level travel behaviour data of this sort. The available transport data at the macro level is for vehicular ownership and is not disaggregated by sex. Population census data includes data on transport modes at the national and state level, but none of it is disaggregarted by sex. Therefore, for mainstreaming one must depend on available micro studies, which are inadequate for larger policy framing purposes.

7.2 Lack of Overall Transportation Planning

In India, overall city level transportation planning started with the framing of the National Urban Transport Policy (NUTP) in 2006, which was revised in 2014. Subsequetly, cities were required to to prepare a City Mobility Plan (CMP) in order to access government funds under the Jawaharlal Nehru National Urban Renewal Mission (JNNURM). Of the total funds released by the national government, 21.7 per cent were for transport-related expenditures, including road-based infrastructure including flyovers and road widening (10.7 per cent) and mass rapid transit systems like the the BRTS in Ahmedabad (9.3 per cent).[95] Road expenditures include footpaths and street lights, which are essential for improving women's mobility.

7.3 Inadequate or Non-Existing NMT Infrastructure

In India, large sections of cities and nearly all of small and medium towns lack walkable footpaths. This has adverse consequences on women's mobility, forcing them to walk in the streets. There are no cycle lanes, and with a few exceptions cylists also ride in the middle of the street. Often, women ride on the back of bicycles behind a man, increasing the risk of accident in mixed traffic. Many large cities have unpaved streets, making them difficult to cross, particularly during the rainy season. Cities also often have poorly lit streets, making them unsafe for women after dark.

Figure 7.1: A newly developed area in Gurgaon with no footpaths

Photo Credit: Author

Figure 7.2: Street vendors in lanes reserved for NMT in Ahmedabad

Photo credit: Centre for Urban Equity.

Figure 7.3: Incomplete lane reserved for NMT modes along the BRTS corridor in Ahmedabad

Photo credit: Centre for Urban Equity.

7.4 Lack of Urban Planning and Integration of Transport

Transport systems generally follow real estate and housing development. This is true for both high- and low-income areas. The low-income areas that have sprung up on cities' peripheries are largely informal settlements, where transport access is usually insufficient. This creates a huge accessibility problem for women. The NUTPs of 2006 and 2014 have strongly argued for integrating transportation planning into land use planning. But these policies do not address how to integrate the informal settlements, which dominate the urban landscape in all Indian cities, into either land use planning or transportation planning.

Photo credit: Sarath KT (Centre for Urban Equity)

8. Moving Towards Gender-Sensitive Transportation Planning

Currently, in Indian cities, women in general and low-income women in particular have a very low carbon footprint. However, this comes at a high price: women remain income and expenditure poor, capability and functioning poor, time-poor, energy-poor and safety-poor. Low-income women in particular suffer from all these dimensions of poverty due to their low mobility and limited access to opportunities in the city, including employment, education and health services. Clearly, policy must be focused on increasing women's mobility in Indian cities, and specifically address how to increase mobility for low-income women so they can increase both their income overall empowerment. This would mean that Indian cities must adopt a transport paradigm that is gender inclusive. As mentioned above, the term 'gender' represents not just biological differentiation between men and women, but also the social, cultural, economic and political factors that act on biological differentiation. These factors create a patriarchal society that seeks to keep women under perpetual control of family, society and the state. This control is achieved in multiple ways, one of which is to deny women the opportunity to be mobile and move freely in urban space. Gender inclusive transportation can provide an opportunity for women to escape the patriarchal yoke and enjoy freedoms that they are usually denied.

8.1 Importance of Macro Level Policies

Gender inclusive transportation policies are contingent upon many macro level policies at both national and city level regarding housing, infrastructure and land use These three issues determine urban form as well as women's (and everyone else's) right to the city and its opportunities. Urban form that includes mixed land use and heterogeneous neighbourhoods where all class and social groups co-exist creates opportunities for all. This type of urban form requires less travel and encourages sustainable mobility options. Thus, improving women's mobility is linked to urban land use patterns and the urban form.

Box 5: National Urban Transport Policy – 2006, India

Among the objectives of the National Urban Transport Policy (NUTP) in 2006 were the following:

- To bring about a more equitable allocation of road space, focusing on people, rather than vehicles.
- To encourage greater use of public transport and NMT by offering central financial assistance.

The NUTP found that in Indian cities, the way transport systems are set up creates a situation where low-income groups end up paying more in terms of cost as well as time. What's more, NMT users are pushed off of roads. Lanes and corridors must be reserved for NMT and urban public transport must give NMT priority in road space allocation. The policy also addressed differential public transport systems that emphasize affordability and time efficiency, and also examined in detail different technologies for public transport. In essence, the policy emphasized the need for public transport and showed a willingness to divert funds from projects that add to road capacity towards public transit systems and initiatives that promote NMT and improve safe access to public transport. The central government gave priority to the construction of cycle tracks and pedestrian paths in all cities under JNNURM funding.

Figure 8.1: NMT lane along the BRTS corridor in Delhi

Photo credit: Centre for Urban Equity.

Figure 8.2: NMT lane along the BRTS corridor in Pune

Photo credit: Centre for Urban Equity.

Housing policy is another essential link. Indian cities typically have mixed land use, with different income groups living in close proximity. Low-income groups generally live in informal settlements and middle and high-income groups in formal housing. Housing policy should aim at improving informal settlements when they are located in mixed-income areas. Both mixed land use and mixed-income living will make work available to women in the neighbourhoods where they live, allowing them to multi-task as per the gender roles ascribed to them. In other words, this form of urban development will fulfil practical gender needs, as defined earlier in this paper. Segregated land uses leads to long travel distances that result in women dropping out of the labour market. When low-income populations are pushed to the urban periphery it has a similar effect on women and their livelihoods.

Figure 8.3: A woman using the cycle track along the Bhopal BRTS corridor

Photo credit: Centre for Urban Equity.

However, if the urban form is to be determined by real estate markets alone and not through people-centre planned interventions, it will create reduced levels of accessibility. Transportation systems are supposed to create access, but they often are not able to complete their mission, as transport systems require large amounts of capital and sustained subsidies, which is not always available in developing countries. In India, public transit did not get much funding until the National Urban Transport Policy (NUTP) was formulated in 2006. Since then, the Indian government has made funds available for public transit projects in many cities. There is also increased awareness about the need to enhance NMT options in cities. Many Latin American countries, including Brazil, Columbia and Bolivia, have invested in subsidised public transit systems to increase accessibility of the urban poor in the cities. Though there has been progress in this direction, India has not yet reached the per capita income levels of these Latin American countries, and thus does not have the funds necessary to make such investments.

Box 6: National Urban Transport Policy – 2014, India[96]

The NUTP 2006 was reviewed and revised to frame NUTP 2014. The vision and objectives remain the same as of 2006 policy. The revised policy also emphasizes public transport and NMT, with the introduction of the concept of Transit Oriented Development (TOD). It also states that the philosophy of transportation planning should be 'avoid-shift-improve': to avoid increase in demand, users should shift from private transport to public transport and improve transport technology and fuels. Avoidance, however, may not benefit women in the context of their low mobility. Unlike the previous policy, the revision addresses universal accessibility for different user groups, including women, pregnant women and children. Mass Rapid Transit is also discussed for the first time in this version, as well as using electric vehicles as para-transit options.

While the revision discusses in detail first and last mile connectivity issues and policies, it does not include safety options that are specifically for women. Walking and cycling safety issues are discussed for the population in general. The revision does address safety for women in public and para-transit. "For the safety and security of women and commuters in general, (those) operating public transit in all cities should deploy only police-verified drivers and conductors in the buses. All bus stations, terminal areas, etc. should be fitted with GPS and CCTV cameras and should be connected to a centralized control room for continuous monitoring….Para-transit drivers shouldn't be given licenses unless they have police verification. Further at micro-level, it should be ensured that the street design being adopted in the city has provision for proper lighting of the streets; avoiding dead-ends or dreary, dark spaces." (pp. 24)

8.2 City Level Transportation Planning

City level transportation planning is required to integrate land use and transport options, including those for informal settlements. However, transportation planning responds to city size, structure and geographic features. Thus, affordable public transit is an important issue for large cities. Affordable public transit is particularly gender-inclusive as women tend to use public transport more than men. In small and mid-sized cities NMT and IPT would be of greater relevance, but only if they are made safe from both traffic and sexual harassment point of view. Public transit will work only if NMT infrastructure is safe and convenient for access to and from the public transit stations. In all cities, women's mobility will improve if public transit and NMT infrastructure are improved to make both more accessible and safe. However, as both versions of the NUTP mention, cities must shift from expenditures that encourage private motorized transport to those that encourage public transit or IPT. Regarding public transit, cities must make appropriate choices and not let themselves be carried away by capital-intensive projects to the detriment of other options.

Women's mobility will enhance only when cities have overall mobility plans that include measures to increase the mobility of the urban poor. Urban mobility plans should consist of a mix of different modes of public transport linked to NMT and IPT, with low-carbon options.

8.3 Affordable and Safe Transport Options

Meeting strategic gender needs would mean that women would be empowered to move through the public space to undertake all types of work and participate in the city's socio-political activities. This scenario would require transport options that are affordable and safe at any time of day. Streets, public transport stations and walking infrastructure would need to be appropriately designed. Footpaths must be provided on all roads and not just the main arteries, as is currently the case in most Indian cities. In order to improve walking for all sectors of the urban population, traffic management practices such as footpath management and parking policy are essential. There are other co-benefits to this type of transport system improvement; both children and the elderly will benefit from gender-sensitive planning. Improved footpaths, in particular are an essential gender-specific priority. Safe, well-lit footpaths that are wide enough for vendors and other activities benefit women, as the vendors can act as 'eyes on the street,' that impede sexual harassment.

8.4 Indicators of Gender Inclusive Transport

Indicator-based assessment of transport through a gender lens can take this process forward. The Indian Ministry of Urban Development (MoUD) has developed transport-related service level benchmarks.[97] These benchmarks have been adapted to present list indicators (Table 4) that would identify gender-inclusive, low-carbon transport planning. The Table 4 indicators should work in conjunction with the overall transport related indicators.

Table 8.1: Indicators and benchmarks of gender-inclusive transport

Dimension	Indicator	Benchmark
Urban form – mixed land uses and heterogeneous neighbourhoods	Trip length	Related to the city size, varying from 2 kms for a small sized city to 10 kms for a mega city
	Trip time	Related to city size, varying from 20 minutes for a small sized city to one hour for mega cities
Mode share	Proportion of NMT trips	Related to city size, varying from 75 per cent for a small sized city to 25 per cent for a mega city
Enhanced mobility	Proportion of public transit / IPT trips	Related to city size, at least 50 per cent in a mega city to 25 per cent in a small sized city
Public transport / IPT quality	Distance to public transit/ IPT stops	10 minutes by foot
Affordability	Expenditure on transport	Up to 10 per cent of household expenditure for low-income households
Walking infrastructure	1.5 meter wide footpath	Related to city size; 50 per cent of city to be covered for small sized and more than 75 per cent for mega cities
	Street lights	Every 50 metres
Safety for women	Activities around the clock to act as 'eyes on the street'	Urban design to include spaces for street activities such as vending, social gathering, etc.
	Well lit bus stops	All bus stops to be well lit
	Presence of bus information system	All bus stops to need these to inform women, particularly when waiting for buses at night

Source: By the author

8.5 Policy Emphasis on Increasing Mobility and Not Only Reducing Carbon Footprint

Lastly, if sustainability arguments or climate policies are to target retaining the current low ecological footprint of women, it might do disservice to women, in particular to those in the low-income groups, who might need to expand their use of transport services. Currently, as it stands, women in Indian cities have a low ecological footprint and in this way are contributing towards sustainable cities, albeit at the price of low levels of development for women. However, women's opportunities for advancement should not be sacrificed at the altar of environmental sustainability and climate policies.

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Information about the project:

UNEP Transport Unit in Kenya, UNEP DTU Partnership in Denmark and partners in India have embarked on a new initiative to support a low-carbon transport pathway in India. The three-year EUR 2.49 million project is funded under the International Climate Initiative of the German Government, and is designed in line with India's National Action Plan on Climate Change (NAPCC). This project aims to address transportation growth, development agenda and climate change issues in an integrated manner by catalyzing the development of a Transport Action Plan at the national level and Low-Carbon Mobility plans at the cities level.

Key local partners include the Indian Institute of Management, Ahmedabad, the Indian Institute of Technology, Delhi and CEPT University, Ahmedabad. The cooperation between the Government of India, Indian institutions, UNEP, and the Government of Germany will assist in the development of a low-carbon transport system and showcase best practices within India, and for other developing countries.

Homepage : www.unep.org/transport/lowcarbon

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