Impact of transport projects on accessibility and mobility of the urban poor
Case of the Delhi Metro

Presentation

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INTRODUCTION

- Transport strategies/policies impact the complex interrelationships existing between the physical environment and social, economic, and political activity.

- Transport is a derived demand, i.e. transport is used only when the need to move exists, and the need to move is dictated by socio-economic requirements of the users.
The problem

- The users are not a homogeneous group
- Some users may benefit, some may not, and some may not be affected at all
- Also the non-users may be impacted – an externality (+ve or –ve)
- Benefits and dis-benefits to users and non-users need to be understood and internalized by transport projects.
TRANSPORT AND POVERTY

Defining Poverty
“a multidimensional phenomenon, encompassing inability to satisfy basic needs, lack of control over resources, lack of education and skill, poor health, malnutrition, lack of shelter, poor access to water and sanitation, vulnerability to shocks, violence and crime, lack of political freedom and voice”. The World Bank (a,1999) “poverty must be seen as the deprivation of basic capabilities rather than merely as lowness of income” (Sen, 1999).

Poverty impacts of transport interventions
Complex because transport is an intermediate service – transport improvements reduce poverty not through increased consumption of transport per se but through improving the quality and security of access to work, markets, and services, and through release of scarce resources for consumption and production
Issues

- **Efficiency vs Equity**: Good transport policy contributes to poverty reduction by enhancing efficiency and equity (Gannon, et al, 2001).

- **Access and Livelihood needs of the urban poor**: Urban transport interacts with employment issues for the poor in two main ways: indirectly by providing access to employment opportunities and directly through employment of low-income people in the transport sector.

**DEPENANCY CONSTRUCT: SOCIETY AND TRANSPORT SYSTEM**

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SOCIETY
  (URBAN POOR)

Access to livelihood
  (eg. bus, cycle, pedestrian)

Means of livelihood
  (eg. Rickshaw pullers)

Facilitator of livelihood
  (eg. Hawkers)

TRANSPORT SYSTEM
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- **Gender Bias:** Women tend to have different travel needs deriving from the multiple tasks they must perform in their households and in their communities (Greico et al, 1997).

- **Health Impacts of Transport:** Pollution (air, water, noise) effects the urban poor particularly severely, since they are the least able to avoid or seek protection from them (UNDP 1998). Pedestrian and cyclist are most vulnerable to road accidents.

- **The Shelter-transport-livelihood link:** Access to affordable transport is one of the most important factors in determining livelihoods for the urban poor. The rise of private vehicular traffic has decreased bus speeds and service levels drastically and made non-motorized transport dangerous and difficult. Travel for the poor has thus become slower and more difficult even as other economic and planning forces have caused many of them to be displaced from central informal settlements to more peripheral locations (Immers et al, 1993).
Eviction and relocation

The central concern of the process of eviction and relocation is the reduction in accessibility and mobility options of the urban poor, which directly affects their livelihood and thus social well being.
Need for Study:

- The understanding of a community as a disaggregated mass (differentiated by income, occupation, gender, age, ethnicity, etc.) specifically in the Indian context.

- The gap between access availability (transport infrastructure) and mobility issues (ability of different groups to utilize the infrastructure) and their correlation with poverty (especially with respect to livelihood opportunities).

- A methodological framework or model for ensuring the inclusion of socio-economic issues of transport planning in policies and projects in India
THEORETICAL FRAMEWORK
(Figure 3.1)

- The Poor (urban)
  - Geographic grouping (slums)
  - Occupational grouping (rickshaw pullers, hawkers...)
  - Socio-economic profile

- Social well-being indicators
- Mobility indicators
- Accessibility indicators

- Relationship between mobility and well-being
- Relationship between mobility and accessibility

- Transport System (urban)
- Condition of Infrastructure (urban)

- Usage of Infrastructure

- Transport project

LEGEND
- Existing System
- Direct Impact
- Indirect Impact

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ACCESSIBILITY, MOBILITY AND SEWB

Accessibility and mobility overlap or are interchangeably used

Where the earlier urban development models were mobility based – increasing movement and speed of movement as a sign of progress – the current discourses of sustainable development advocate accessibility-based models, ensuring that the desired destinations and services are within reach of people

According to Vivier (2001) mobility is dependent on having recourse to a motorized transport mode and accessibility is dependent on dense urban planning and provision of public transport.

Ross (2000) defines mobility as the “amount of travel people undertake” and measures it by per capita vehicle kilometers traveled. He defines accessibility as “the ease of access to destinations” and measures it by quality of public transportation and distance to be negotiated to reach destinations.
Negatives of Mobility according to the literature

High cost of motorized mobility

Vivier (2001) the journeys by the motorized city dwellers in mobility based urban and transport systems are “expensive for the community, consume large amounts of non-renewable energy, and generate major emissions of greenhouse gases”.

Ross (2000) says that “mobility contributes nothing to wealth, can be wasteful of resources, damages communities, and contributes to air, water and noise pollution.”

Social exclusion

Vivier (2001) states that “mobility, like all consumptions of goods and services, is very unequally distributed amongst city dwellers. One can even say that the growth of urban mobility has been accompanied by a worsening of the phenomenon of exclusion, due to the development of low-density peripheral quarters which are devoid of stores and local services and are poorly served by public transport. In the absence of adequate public transport, those excluded from the automobile are thus also more or less excluded from employment, services and leisure activities.”
Discussion on Mobility

The word mobility can mean either the ability to move, or the amount of movement

Amount of movement – negative

- social, economic and environmental costs.
- “Forced mobility” is a negative fallout of policies of suburbanization, relocation

Ability to move – positive

- Difference between plants and animals
- Expression of personal freedom
- Forced immobility of poor, women, elderly, disabled is negative

If mobility is defined only as the amount of movement, it assumes that the user group is homogeneous - bias against people with constrained mobility. Policies that reduce amount of movement may in fact seriously dis-benefit them
Discussion on Accessibility

Different definitions of accessibility can be clubbed together under following subheadings

1. **Landuse accessibility**: This refers to the geographical allocation of opportunities, is dependent on urban planning and land use distribution and is represented by the distance to opportunities.

2. **Transport accessibility**: This refers to how the transport system facilitates access to opportunities and is dependent on the quality of the transport system including the civil infrastructure and transport modes available. This can be further studied in two parts of the trip – access trip and mainline haul
   - Access to the transport system
   - Access to destinations of choice
Discussion on Socio-economic well being (SEWB)

Different definitions and scales like HDI, QOL, SWB etc.

Define SEWB as the status of a household where the basic social and economic needs for survival are fulfilled and the household has the capacity to improve its quality of life.

SEWB can be measured with the parameters of literacy and education, employment, income and consumption, shelter and urban services, health and nutrition, environmental concerns, safety and security, time use and availability.
Definitions

**Accessibility**

Accessibility is a description of the proximity of destinations of choice and the facilitation offered by the public transport systems to reach them.

**Mobility**

Mobility is both the ability to travel to destinations of choice and the amount of movement necessary to do so.

**Socio-economic well being (SEWB)**

Socio-economic well-being is defined as the status of a household where the basic social and economic needs for survival are fulfilled and the household has the capacity to improve its quality of life.
CASE STUDY: DELHI METRO RAIL

Delhi

- Population of 13.8 million (Census, 2001).
- Modal share - 62% of the vehicular trips (33% of all trips including walk) are made by bus with an average trip length of 10.7 Km (RITES, 1994).
- Heavy investments in transport infrastructure, like grade separated junctions, road widening and the Delhi Metro Rail.

The Delhi Metro is a representative case study of a capital-intensive urban transport project promising to accrue high benefits of accessibility and decongestion.
Part map of Delhi showing Case Study Area of Metro Rail line and locations of household survey
Case Study – Target Group

Urban poor affected by the Delhi Metro Rail Project

Urban poor as the inhabitants of slums in the city

- Urban Delhi poverty line at Rs 505.45 (USD 12.64) per capita per month, (Saxena, 2001)
- For Delhi slums per capita income of less than Rs. 600 (15 USD) per month for 78% inhabitants (Anand, 2006)

Two categories of low-income households selected:

- those living in the vicinity, within 1 km (access/egress the time for upto 85% probability of walking and bicycling to access public transport is 15 min. At a walking speed of 4 Km/hr, this equals to an access/egress distance of 1 Km, Krygsman et al, 2004) of the metro stations, and
- those relocated due to the construction of the metro.
Households in the vicinity of the metro line

Socio-economic profile

- Approximately 66% of the respondent families are from Uttar Pradesh and 25% are from Bihar, and on an average they have been in Delhi for over 20 years and in the surveyed settlements for over 16 years.
- Approximately 47% of the respondents are illiterate and there is no change in literacy levels.
- The work participation rate is 33% which does not change with the metro.
- The change in household income shows that for 66% of the households the income has not changed with the construction of the metro, for 10% it has decreased and for 24% it has increased.
- 74% of the households do not own a vehicle and 21% own cycles. The status remains unchanged.
Accessibility

- The bus route availability and frequency has reduced after the metro for the community.
- The average distance to bus-stop, school and urban services is 1 Km, 1.41 Km and 1.2 Km respectively and the status does not change significantly for most households.

Travel profile

- The introduction of the metro shows no significant change in the number of daily trips, daily travel distance, daily travel time and daily travel costs. Considering that only 8% of their trips are on bus and 77% by walk, 4% by cycle and 6% by rickshaw, it is unlikely that these trips will be replaced by metro trips.
Households relocated due to the metro

Socio-economic profile

- Approximately 66% of the respondent families are from UP and 24% are from Bihar, and on an average they have been in Delhi for over 24 years and in the surveyed settlement for 3 years.

- Approximately 59% of the respondents are illiterate and there is no change in literacy levels.

- The work participation rate has increased from 24.4% to 26.25% after relocation.

- The average household income has reduced from INR 3145 to INR 2514 after relocation. The change in household income shows that for 19% of the households the income has not changed after relocation, for 66% it has decreased and for 15% it has increased.

- 75% of the households did not own a vehicle and 21% owned cycles before relocation. After relocation the number of households not owning vehicles increased to 79% and the numbers owning bicycles decreased to 17%.
### Accessibility

- The bus route availability and frequency has reduced after relocation for the community. The decrease in average frequency from 5 min to 63 min is almost 13 times.

- The average distance to bus-stop, school and urban services was 0.1 Km, 0.7 Km and 1.8 Km respectively and the status changed to 0.3 Km, 0.62 Km and 6 Km respectively.
Travel profile

- The number of trip segments made daily shows a shift to higher trip categories after relocation with the average increasing from 3.8 to 4.2 trip segments.
- The daily travel distance shows a shift to higher categories after relocation with the average increasing from 4.4 Km to 15.4 Km.
- The daily travel time shows a shift to higher categories after relocation with the average increasing from 32 min to 77 min.
- The daily travel cost shows a shift to higher categories after relocation with the average increasing from INR 2 to INR 7.
<table>
<thead>
<tr>
<th>Indicator</th>
<th>Basti Near Metro</th>
<th>Basti relocated due to metro</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Before Metro</td>
<td>After Metro</td>
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<tr>
<td>Average Travel Distance to work (km)</td>
<td>4.48</td>
<td>4.70</td>
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<tr>
<td>Average Travel Distance to education (km)</td>
<td>1.71</td>
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<td>Average Distance to Education (Primary School and Sec school)</td>
<td>1.2</td>
<td>1.2</td>
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<tr>
<td>Average Distance to urban services (including daily needs shop, PO, veg market, Doctor etc)</td>
<td>1.41</td>
<td>1.41</td>
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<td>Modal Shares (% share)</td>
<td>Basti Near Metro Before Metro</td>
<td>After Metro</td>
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<tr>
<td>------------------------</td>
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<tr>
<td>Pedestrian</td>
<td>77.99</td>
<td>77.96</td>
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<td>Cycle</td>
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<td>Buggi</td>
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<td></td>
<td>Before Metro</td>
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<td>Average pedestrian trip distance</td>
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<td>Average cycling distance</td>
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8. Conclusions

Impact of Metro on the poor household in its vicinity

- No significant impact on the SEWB and Mobility
- While the landuse accessibility remains unchanged too, the transport accessibility has changed as distance to the bus stops has increased for 19% of the households and bus services have become non-existent for 33% of the households.

Impact of Metro on the poor households relocated

- There is significant impact on Accessibility, Mobility and SEWB
- The land-use accessibility has deteriorated as distance to education, health services and other urban services has increased for 52%, 63% and 52% of the households respectively. The transport accessibility has deteriorated even more as distance to bus stop has increased for 72% of the households and the bus frequency has seen an average decrease from 5 min to 63 min (almost 13 times)
The mobility of the households have increased significantly. The PCTR for work has increased for 49% of the households and decreased for 30%, implying change in number of trips made for work in the households. The share of NMVs amongst the mode used has decreased for 59% of the households. The mobility indicators for travel to work – distance, time and cost – have increased for 83%, 82% and 61% of the households respectively.

The SEWB indicators most affected are female literacy (21% decrease), residency (100% decrease), Household income per person (66% decrease), Infrastructure rank score (33% decrease and 61% increase), and employment (8% decrease and 14% increase). The indicators of adult literacy and vehicle ownership show least change with 82% and 94% respectively in the no change category.

The results imply that relocation due the metro has had a significant negative impact on the SEWB of the poor households.
Correlation of SEWB to Accessibility and Mobility

- SEWB is affected by indicators of both accessibility and mobility
  - SEWB is negatively correlated to spatial distance to education, health and other urban services
  - It is positively correlated to PCTR for work, education and other purposes
  - It is negatively correlated to travel distance, time and cost
- The significance of indicators changes with change in situation like the new metro line or relocation due to it
  - PCTR for work is positively correlated with SEWB and has the highest coefficient in all datasets, indicating the mobility for work is important in ensuring their SEWB, whatever be their situation
  - Cost of travel has no significance in explaining SEWB of the urban poor but it becomes significant when they are relocated and now have to pay heavily for the travel
In conclusion…

This study illustrates that the accessibility and mobility and hence the socio-economic well-being of the urban poor is affected by its introduction in the urban transport system.

While they may not be expected beneficiaries of the project, the dis-benefits accrued to them due to the project need to be assessed, and hence mitigation measures planned when proposing the project.

Hence, it is important to conduct Socio Economic Impact Assessment (SEIA) studies for a new project over disaggregated groups, specifically including impacts on the most vulnerable group – the urban poor.
Policy recommendations

- The delineation of the impacted population for a transport project should include not only the expected users but the non-users affected by it too.
- The accessibility and mobility needs of the urban poor need to be studied and the urban poor should be seen as captives of the systems they are using. Introduction of any policy or project that changes their status has to be carefully monitored for impacts.
- The cost-benefit analysis of a transport project should include the dis-benefits to non-user groups and the costs of compensation/mitigation measures inbuilt as part of project cost. The Government should constitute a statutory body responsible for the SEIA of all infrastructure projects before they are given approval for implementation. This is in keeping with the social welfare function of the Government.
- All funding mechanisms for transport projects should have inbuilt monitoring and evaluation protocols with stringent SEIA guidelines.