

# Assessment of a possible post-MDG Urban Transport Indicator



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## Report Summary

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Evidence on Demand was requested to support DFID in work on what the post MDG framework might look like. This brief report was prepared to consider the data availability and measurability of indicators for a proposed target to halve the number of people without ready access to urban transport services, and the cost of achieving such a target. In the report the interaction between urban transport and urban poverty was highlighted to be multi-faceted, of which affordability is just one element. Actual cost information appears limited, however the report draws on research that argues for direct cash transfer to transport users rather than subsidies to operators as a way forward and an illustrative calculation is made for the scale of costs of such a measure.



# Urban Transport Indicators

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## Proposed indicator

Number of urban people for whom reliable transport services are affordable, (requiring less than 20% of monthly household expenditure).

### 1. Is this the right indicator?

This is a reasonable indicator for the performance of an urban transport system and connects to quite a long running discussion on the affordability of urban transport in developing countries. However, there are 2 issues that need to be considered in adopting this indicator.

Firstly, an average value for this indicator across a whole city may mask significant disparities and inequalities that should be addressed by any indicator that seeks to drive the efforts of the development community. As a result any indicator should have the capability of focusing on the inequalities in affordability across a city. It can be argued, as is frequently suggested in the literature on affordability that any indicator should either focus totally on the lowest income group (say the bottom quintile) or have it as an additional sub-target. A possible wording may be the '*number of the poorest quintile in the city for whom a reliable urban transport system is affordable ((requiring less than 20% of monthly household expenditure)*'

Furthermore, in many developing cities, particularly in Africa, the poorest (frequently women, children, older people (even within richer households) and new migrants on the periphery of cities) are often so income-poor, that they are almost entirely reliant on walking as a means of urban travel (and hence have no transport expenditure) so any efforts to improve the affordability for the average city dweller may not affect this poorest group. It is thus questionable in these circumstances that an affordability indicator like this one will deliver what is presumed to be the objective, efficient urban transport for all, to deliver economic growth.

Secondly, following on from this, the discussion on affordability by Carruthers et al (2005) and others at the World Bank has highlighted the importance of seeing the affordability of urban transport, particularly for low-income communities, in a more holistic context where the development effects of an urban transport system need to be seen in terms of its:

- Affordability
- Availability
- Accessibility and
- Acceptability

Carruthers et al (2005) argue that there should also be indicators and measurement for these other attributes of urban transport as well.

On this basis it is suggested that for development policy purposes an urban transport system in a developing city needs to deliver access for all to services, employment, economic opportunities and social networks, not just mobility per se. It can be argued that there is a case to be made for having an indicator that focuses not on 'affordability' but on 'accessibility'. It is the ability to access basic services and employment within a certain

period of time that will ultimately deliver developmental impact. This delivery can be facilitated by moving people or by bringing services to people or more importantly a combination of both. It is suggested that a very useful indicator that could drive real developmental impact in developing cities, particularly in Africa would be an indicator that is worded 'percentage of the population (or the poorest quintile) who can access key services and opportunities in 30 minutes from their homes'. Key services in this case, would be hospitals, secondary schools, workplaces, markets.

The traditional argument against such indicators is the difficulty of gathering data on such an indicator. Whilst, historically this has been true and such accessibility measurement has been expensive and labour intensive, new technologies such as GPS enabled Smart-phones and widely available Google Maps etc. now make this well within reach of city and national authorities and gives an opportunity for development agencies to lead the way on the adoption of such technology for urban management.

## 2. What is the availability and quality of data to support this indicator and how can this be improved?

There is a range of data on household expenditure on transport across the developing world, though much of this is now dated. Carruthers et al (2005) presented a reasonable synthesis for many global cities, (though few of these are in developing countries), using something called an affordability index (the method of which is explained in the next section) and much of it is presented on data that is over 10 years old now.

City	Per Capita Income U\$PPP	Bottom Quintile Income as Percent of Average	Fare for 10km Travel (PPP U\$ cents)	Affordability Index	
				Average	Bottom Quintile
1 Sao Paulo	8,372	10.0%	130.1	11%	107%
2 Rio de Janeiro	14,325	10.0%	125.4	6%	63%
3 Brasilia	12,985	10.0%	106.8	6%	59%
4 Cape Town	14,452	10.0%	75.8	4%	38%
5 B. Aires	15,493	15.5%	87.6	4%	26%
6 Mumbai	8,585	41.0%	112.2	9%	23%
7 Kuala Lumpur	18,351	22.0%	121.6	5%	22%
8 Mexico City	9,820	15.5%	39.3	3%	19%
9 Chennai	3,717	41.0%	39.3	8%	19%
10 Manila	9,757	27.0%	63.0	5%	17%
11 Krakow	15,579	36.5%	130.6	6%	17%
12 Amsterdam	28,170	36.5%	226.6	6%	16%
13 Moscow	16,154	24.5%	84.6	4%	15%
14 Guangzhou	9,165	30.0%	55.1	4%	14%
15 Warsaw	26,024	36.5%	142.5	4%	11%
16 New York	51,739	27.0%	200.0	3%	10%
17 Los Angeles	42,483	27.0%	160.0	3%	10%



18	Chicago	48,300	27.0%	180.0	3%	10%
19	Singapore	38,797	25.0%	130.3	2%	10%
20	Beijing	14,379	30.0%	55.1	3%	9%
21	Seoul	16,784	40.0%	85.5	4%	9%
22	Shanghai	20,814	30.0%	55.1	2%	6%
23	Cairo	7,117	43.0%	26.1	3%	6%
24	Budapest	22,106	50.0%	89.2	3%	6%
25	London	53,057	30.5%	116.4	2%	5%
26	Prague	32,757	52.0%	88.0	2%	4%
27	Bangkok	20,386	31.0%	32.2	1%	4%

Sources: Carruthers, R., Dick, M. and Saurkar, A., 2005, *Affordability of Public Transport in Developing Countries*, The World Bank Group Transport Papers TP-3, Washington D.C.

[http://siteresources.worldbank.org/INTTRANSPORT/214578-1099319223335/20460038/TP-](http://siteresources.worldbank.org/INTTRANSPORT/214578-1099319223335/20460038/TP-3_affordability_final.pdf)

[3\\_affordability\\_final.pdf](#)

Carruthers derives income from Millennium Cities Database, WB country income data; bottom quintile derived from WB database: Fares for 10km of travel derived from Internet data and World Bank country offices.

### **Table 1 Percent of household income allocated to transport expenditure and by poorest quintile global cities**

A reasonable synthesis is also presented in Diaz Olera et al (2008) of data from across Sub-Saharan Africa, though again, much of this is now over 10 years old.

City	Survey	Date	% Spent on transport	Source
Abidjan	Enquête Budget-Consommation	1979	8.5	Direction de la Statistique (1986)
	Enquête Niveau de Vie	1995	11.9	INSD (1999)
	Enquête Uemoa sur les Dépenses des Ménages	1996	9.5	INSD (1999)
Bamako	Enquête sur les Dépenses des Ménages Urbains	1985 1986	15.1	Sanogo (1993)
	Enquête Budget-Consommation	1988 1989	14.6	INSD (1999)
	Enquête Uemoa sur les Dépenses des Ménages	1996	11.2	INSD (1999)
Conakry	Enquête de Consommation auprès des Ménages	1990 1991	9.2	Arulpragasam and del Ninno (1993)
Cotonou	Enquête Budget-Consommation	1986 1987	10.2	INSAE (1994)
	Enquête Légère sur les Activités Economiques des Ménages (Elam 5 bis)	1996	22.1	INSD (1999)
	Enquête Uemoa sur les Dépenses des Ménages	1996	9.8	INSD (1999)
Dakar	Enquête Sénégalaise auprès des Ménages	1994 1995	6.8	Ministère de l'Économie, des Finances et du Plan (1997)
	Enquête Uemoa sur les Dépenses des Ménages	1996	8.2	INSD (1999)
Dar es Salaam	Human Resources Development Survey	1993	9.1	Diaz Olvera et al. (1998)
Douala	Enquête Maetur	1978	8.0	Ngabmen (1997)
	Enquête Budget-Consommation	1983 1984	9.0	Lynch (1991)
	Enquête Camerounaise auprès des Ménages	1996	12.1	Ministère de l'Économie et des Finances (2001)
	Enquête Dépenses des Ménages	2000	16.0	Ministère de l'Économie et des Finances (2001)
Kampala	National Household Survey	1999 2000	9	Uganda Bureau of Statistics (2001)
Kinshasa	Enquête Consommation	1969	4.4	Houyoux et al. (1986)
	Enquête Consommation	1975	7.4	Houyoux et al. (1986)
	Enquête Budgets des Ménages	1986	9.4	Houyoux et al. (1986)
Lagos	Consumer Expenditure Survey	1985 1986	0.9	Canagarajah et al. (1996)
	Consumer Expenditure Survey	1992 1993	3.7	Canagarajah et al. (1996)
Libreville	Enquête Budget-Consommation	1993 1994	9.4	World Bank (1997)
Lomé	Enquête Budget-Consommation	1987	10.4	INSD (1999)
	Enquête Uemoa sur les Dépenses des Ménages	1996	8.3	INSD (1999)
Mombasa	Welfare Monitoring Survey	1997	4.5	CBS, HRSSD (2000a)
Nairobi	Welfare Monitoring Survey	1997	7.6	CBS, HRSSD (2000a)
Ndjaména	Enquête Conditions de Vie des Ménages	1990	6.8	Rone (1995)
Niamey	Enquête Budgets Familiaux Africains	1961 1962	5.3	Michaud (1964)
	Enquête sur la Consommation de Produits Essentiels	1986 1987	8.7	Direction de la Statistique et de l'Informatique (1988)
	Enquête Budget-Consommation	1989 1990	15.2	DSCN (1994)
	Enquête Permanente de Conjoncture Economique et Sociale	1995	13.4	DSCN (1997)
Ouagadougou	Enquête Uemoa sur les Dépenses des Ménages	1996	11.8	NSD, 1999
	ESP	1994 1995	12.9	INSD (1999)
Yaoundé	Enquête Uemoa sur les Dépenses des Ménages	1996	15.6	INSD (1999)
	Enquête Maetur	1978	6.1	Ngabmen (1997)
	Enquête Budget-Consommation	1983 1984	11.0	Lynch (1991)
	Enquête Rapide sur la Consommation des Ménages	1993	14.8	Ngassam and Roubaud, 1994
	Enquête Consommation 1-2-3	1993	16.8	DIAL, DSCN (1993)
	Enquête Camerounaise auprès des Ménages	1996	13.8	Ministère de l'Économie et des Finances (2001)
	Enquête Dépenses des Ménages	2000	18.3	Ministère de l'Économie et des Finances (2001)

Source Diaz Olvera et al (2008)

**Table 2 Household expenditure allocated to transport in African cities from consumption surveys**



### 3. How measurable is the indicator and what would be the approach?

One approach to measurability was developed by the World Bank nearly 10 years ago. Carruthers et al (2005) developed the affordability index which is based on the travel survey approach to transport expenditure that was highlighted above.

To calculate how **affordable** public transport is in the city.

The form of the Affordability Index<sup>1</sup> is relatively simple, and the data for its compilation is relatively easily available:

$$\text{Affordability Index} = \frac{\text{Number of trips} \times \text{Average cost per trip}}{\text{Per capita income (Average or Bottom Quintile)}} \text{ expressed as a \%}$$

In order to calculate it the Assessment team need to:

- Find the average per capita monthly income and the average for the bottom quintile of the income distribution, for the city;
- Determine the minimum public transport fare to travel 10km using a daily ticket
- Calculate the cost for 60 trips at this fare;
- Express this cost as a percent of the average and bottom quintile monthly incomes.

Diaz Olvera et al. (2008) highlights that the value for the household transport expenditure and hence the affordability travel is dependent on not only the city and country economic context but also the data collection method. They identify two methods, household expenditure and consumption surveys and household travel surveys.

They report that travel survey-based approaches, as described in the Carruther affordability index, always report that the poor spend a greater % of their income on travel, whereas omnibus based household expenditure and consumption surveys report that the higher the household income, the higher percentage spent on travel.

They highlight that from expenditure & consumption surveys across Sub-Saharan Africa, urban households devote 8-15% of their expenditure to transport. This percentage increases the more affluent the household.

However, if household travel surveys are used then these focus on income, not expenditure and are often less recent than expenditure and consumption surveys, but there is general agreement that the share of transport consumption within the overall consumption pattern decreases as income rises. Findings from these surveys, across sub-Saharan Africa show that 15-20% of household income is spent on transport. Importantly, poor households using this methodology spend a greater share of their income on transport than other income groups.

Diaz Olvera et al (2008) set out a range of factors that explain these contradictory results including the differing focus on expenditure and income; an overestimation of small frequent payments for public transport and underestimation of major expenditure on personal vehicle travel in travel survey based methods.

<sup>1</sup> Carruthers, R.; M. Dick and A. Saurkar (2005). Affordability of Public Transport in Developing Countries. World Bank Group Transport Sector Board. January. Washington DC: World Bank Publications. [http://siteresources.worldbank.org/INTTRANSPORT/214578-1099319223335/20460038/TP-3\\_affordability\\_final.pdf](http://siteresources.worldbank.org/INTTRANSPORT/214578-1099319223335/20460038/TP-3_affordability_final.pdf)



The same study highlights a series of measures that could improve the quality of the data. For travel surveys they suggest:

- Information on type and frequency of transport expenditure should be more precise
- Information about actual amount spent on each trip should be collected
- Details about vehicle purchasing strategies of private vehicles could be collected.

For consumption surveys they suggest:

- Transport items should be distinguished from other related items such as communication costs
- Details of vehicles owned by the household systematically collected
- Detail of access to private vehicle assets that individual members may have and additional data on individual household members expenditure, though this will change the nature of consumption surveys away from household.

Turner (Turner & Fouracre, 1995; Turner, 2012) and others have highlighted the challenge of taking average household values of income, expenditure or travel demand, particularly amongst low-income communities, it is clear that women and men do not have equal access across a household to financial or time resources to travel, such as private vehicles and fares for public transport. As a result, values of affordability may seriously underestimate the real challenge for some social groups, particularly women, within the urban poor to access transport and thus connect to basic services such as employment, health and education.

However, all of the data that has been presented above on household transport expenditure is collected on an ad-hoc basis and there is no systematic updating of data sets on this issue. Diaz Olera et al. (2008) partly make the case for moving household transport expenditure away from the transport sector and towards a part of more omnibus-style consumption expenditure is that these are undertaken on a more systematic basis by National Statistical Agencies and Development Policy organisations.

To overcome the challenge of the cost and manpower effort required to do household transport expenditure surveys on a regular basis, it may be worth exploring use of new technology and user-generated approaches to gather urban transport performance.

As described in Section 1 the work done by Carruthers et al highlighted the importance of seeing the affordability of urban transport, in the context of affordability; availability, accessibility and acceptability. He argued that there should also be indicators and measurement for these other attributes of urban transport as well.

In this direction, recent work for UN-HABITAT (Turner and Adzigbey 2012) highlighted the use of GPS-enabled Smartphones to gather data on informal public transport availability, accessibility and travel patterns and community-based participatory approaches to gather data on acceptability and affordability. This has been developed as Tool for assessing the accessibility of urban transport for low-income communities. The manual has been attached as an Appendix to this note.

#### **4. What will be the cost of achieving the target?**

There is a considerable literature on the role and effectiveness of subsidies within the context of urban transport in both developed and developing countries that needs to be considered alongside merely the cost of achieving the target, which goes beyond the scope of this report.



However, the work of Estupiñán et al (2007) sets out a number of the significant issues faced when addressing the question of the cost of achieving the affordability target. This work highlights that many urban transport subsidies are given for a wide range of reasons and policy objectives, only a few of which are for social re-distribution objectives. Having said that, they provide a useful review of a series of subsidies and measures that seek to improve the affordability of urban public transport across a number of cities of the developing world. Overall, this work argues in favour of direct cash transfers to beneficiaries rather than price or operating subsidies to operators.

They initially make the point that in many developing cities, the initial challenge is that for many low-income residents walking is the main mode of transport, particularly women, children and older people and that public transport, however affordable, is still out of the reach of many residents for many journeys. They argue that the evidence suggests that currently public transport is a 'luxury good' for many low-income urban households.

They go on to highlight a series of measures to improve affordability. These are divided into two groups according to who they are targeted at:

- demand-side measures (received by beneficiaries) or
- supply-side (received by operators)

Measures reviewed included:

#### *Demand-side*

- Means tested transfer funded from general taxation
- Concessionary fares – reduced fares for older people etc.
- Transport vouchers
- Quality self-selection
- Flat fare structure – capped fares

#### *Supply-side*

- Conditional direct operating subsidies
- Fuel tax rebate – a reimbursement of duty on diesel such as happens in the UK.
- Infrastructure grants
- Unconditional operating and capital subsidies

This note will look at a few of these measures by way of illustration.

#### Demand-side measures

##### *Means-tested transfer funded from general taxation*

They highlight the case of direct money transfers that were implemented in Chile as a result of rising transport costs.



## Case Studies 1 Welfare transfers as a transport subsidy: Chile's compensatory welfare payments due to rising transport costs

With the rise in the international price of crude oil during the last five years there was mounting political pressure in Chile—as in many other countries—to shield domestic consumers from the impact of this rise on domestic fuel prices. Bus fares rose 31% between 2003 and 2006 as a direct consequence of the increase in fuel prices. The consumer price index during this same period rose by only 7.5% indicating a very important relative price increase for public transport.

Starting in 2004 authorities chose to give a direct monetary transfer to poorer households to compensate for rising fuel and public transport prices. It was argued that this policy was much more progressive and better targeted than policies aimed at reducing retail fuel prices. Similar transfers were again granted in 2005 and 2006 for the same reason.

In the Presidential address for the budget law that conceded the 2004 transfer, the Executive declared that the transfer was sufficient for a poor beneficiary to fund higher domestic kerosene prices and *nine months of higher public transport fares*. Rising fuel prices was also explicitly mentioned as the motivation for the 2005 and 2006 transfer.

Starting in 2005 eligible households included pensioners with government guarantees or support, households in the poverty-alleviation “Chile Solidario” program, families receiving the Family Subsidy, and workers who were receiving a family supplement subsidy and who earned less than Ch\$180,000 (US\$350) per month. The eligible population was close to 2.2 million households, representing 40% of Chilean households.

The fiscal cost of the 2005 and 2006 transfer was US\$ 63 and US\$42 million, respectively. It is important to note that in 2006, pensions had already been increased for poorer people and they were thus excluded from this special transfer. This explains the lower fiscal cost in 2006.

All transfers were funded from general government budget.

Gómez-Lobo (2007a) shows that in Santiago the transfer policy was much better targeted to the poor than alternative subsidies specific to the transport sector such as subsidizing bus fares or fuel prices. Thus, the social consequences of rising transport costs were countered without compromising the resource allocation benefits of cost reflective pricing for fuels and public transport.

Such direct transfer mechanisms require consideration of how the transfer can be made, particularly in contexts without a well-established social protection or social security system. There has however, been work exploring direct transfers by mobile phone in such places as Malawi without well-established social security systems (DFID, 2011).

The option of direct transfers also need to consider intra-household resource allocation as transfers to head of household may not translate to equitable access to the transfer across all members of the household. Women, girls and older women may not have access on an equitable basis and in such case price subsidies may still be beneficial and worthy of further analysis.

### *Transport Vouchers*

They highlight a case in Brazil where employees were allowed to buy transport vouchers at reduced cost through their employers. However, this was focused on the formal sector and this only covered a small percentage of low-income households.



## Case Studies 2 The 'Vale Transporte Scheme in Brazil'

This demand side subsidy mechanism was introduced in 1985 and works as follows. Employers retain 6% of formal workers earnings. In return, these workers receive from their employer transport vouchers for the home-to-work and return trips required during a month. Employers buy these vouchers at the beginning of the month from a selling agency (can be a Bank, a union of transport operators or a municipal or state government agency). Transport operators accept these vouchers and trade them in with the issuing agency for money. Resources spent by firms on Vale Transporte are tax deductible, thus around 35% of the scheme is funded by general tax revenues. The rest is funded by consumers (higher prices), workers (lower wages or higher unemployment), or owners (lower profits). The incidence of this labour tax needs to be studied further.

One striking characteristic of the Vale Transporte is that it provides an interesting and probably effective self-selection targeting mechanism. Workers can opt out of the system, and higher income earners have the incentives to do so since 6% of their salaries will generally be higher than what they spend on commuting. For workers who earn 3 times the minimum wage or higher, public transport costs are below 6% of salaries for workers that take one mode of transport to get to and from work. Thus, workers with higher incomes will usually opt out of the system, helping to reduce leakages to higher income groups.

A substantial number of vouchers are sold by workers in the black market at a discount and these workers then walk, cycle or car-pool to work. Although this does not hurt formal workers, who still benefit from the scheme, it does point to the potential welfare enhancing properties of a direct monetary transfer instead of using voucher that workers later sell at a discount in the secondary market. Gomide, A., S. Leite and J. Rebelo (2004) argue for the direct transfer of benefits to low income workers in the informal sector or the unemployed, groups that do not benefit from the Vale Transporte scheme. They note that about 50% of workers in Metropolitan Regions of Brazil belong to the informal sector and do not benefit from the scheme, a point also raised by Carruthers, Dick and Saurkar (2005).

*Source: The World Bank, Internal Urban Transport Mission Report, Annex IV and Gomide, A., S. Leite and J. Rebelo (2004) as quoted in Estupiñán et al (2007).*

### Supply Side

#### *Conditional Direct Operating Subsidies*

Estupiñán et al (2007) also cite the example of Buenos Aires where an attempt was made to deliver a targeted supply-side subsidy for operators.

## Case Studies 3 Direct transfers to bus operators in Buenos Aires

In Argentina, since the 2002 economic crisis, bus operators receive a direct transfer from the government to keep fares low. This subsidy is based on the number of passengers transported, the firm's gross revenues and kilometres supplied. It is funded from a specific tax on diesel fuel (bus operators do not pay the tax on diesel oil, which in practice implies an additional indirect subsidy). It is interesting to note that the uncertainty regarding the continuity of the subsidy (it has been changed 26 times during the first three years it has been applied), affects investment incentives. (Krantzer, 2005, Bondorevsky, 2007).

Foster (2005) notes that given the excess capacity in the sector, a better choice might have been a demand side subsidy in this case. This would have allowed excess capacity to be eliminated in those routes where there is no demand for the service, increasing allocative efficiency. However, as noted by Krantzer (2005) the 2001/2002 crisis was so dramatic that



given the available time frame the only reasonable choice to keep the public transport system afloat was to introduce this supply side subsidy. Furthermore, a demand subsidy would have been ineffective since only 2 million of the 6 million poor in the Buenos Aires Metropolitan Region would have been targeted had social security programs (such as Plan Jefas y Jefes de Hogar) been used as a targeting mechanism. The errors of exclusion would have been very high. However, Bondorevsky (2007) shows that the majority of subsidy resources go to households in the middle of the income distribution and are thus regressive. Moreover, a comparison between 2002 and 2006 indicates that the incidence of subsidies became more regressive, as the economic recovery process has led to a relatively more intense use of buses by households in the middle of the income distribution.

Source: Estupiñán et al (2007).

### *Unconditional operating and capital subsidies*

Estupiñán et al (2007) highlight that there is a significant body of literature that argues that supply side unconditional subsidies reduce productive efficiency. Therefore, this literature argues, care must be taken when designing supply side subsidies. Estupiñán et al (2007) argues that benefits must be tied to productivity and performance conditions to avoid efficiency problems. They argue that the use of specific tendered contracts is an interesting alternative. By forcing operators to compete for contracts reduces the efficiency problems that supply side subsidies may create. Still, Estupiñán et al (2007) argue that the body of evidence available would indicate that demand side subsidies are preferable to supply side subsidies.

Estupiñán et al (2007) go on to provide some considerations for the design and development of policy measures to improve the affordability of urban public transport. They pose a series of questions in the design. These are:

- Who formally receives the subsidy?
- How is the subsidy distributed?
- How is the subsidy funded?

In terms of understanding the effectiveness of efforts to improve the affordability Estupiñán et al (2007) set out a series of tests to assess different policy measures. Key amongst these are:

- The extent to which any policy impacts on low-income residents
- The extent to which any policy impacts on non-poor residents
- The effect on the efficiency of the public transport operation

The extent to which any policy impacts on low-income residents

Estupiñán et al (2007) argue that there is little evidence to understand the distributional impact of urban transport subsidies. Key to the understanding of distributional impacts are two terms:

- Error of exclusion – the percentage of a target population that do not receive benefit from a subsidy
- Error of inclusion – the percentage of benefiting households who should not be receiving the benefit

In their argument of the greater benefit of direct transfers rather than price subsidies, they highlight data from Chile that compares the distributional impact of different transport

subsidies. This shows that fewer non-poor households are included as beneficiaries (as shown by the error of inclusion) in direct transport case than any other subsidy measure and more poor households benefit (as shown by a lower error of exclusion).

Subsidy	Quasi-Gini coefficient	Error of inclusion	Error of exclusion
Student preferential pass Buses	-0.16 (benefit) -0.11 (funding)	50.6%	70.0%
Student preferential fare Metro	0.13 (benefit) 0.28 (funding)	75.5%	97.2%
Metro investment grant	0.27	77.7%	88.7%
Direct transfer	-0.34	36.5%	51.6%

Source: Gomez (2007)

**Table 3 Comparison of distributional Impact on different Transport Subsidies**

Despite this synopsis of the literature, there is very little that addresses comparative costs of different measures. The cost is thus very difficult to estimate without a significant amount of further analysis. However, it may be worth trying to do some very rough estimates in order to at least provide a ball-park figure.

Using the affordability index, it is possible to take a theoretical case to try and understand the overall cost of a policy measure to improve affordability. This would be based on the premise that providing 'smart', targeted subsidies to particularly users groups of consumers, may be more effective than giving subsidies direct to operators. This would require a different mode of operation for some development agencies, for which infrastructure or capital asset investment has been a more customary approach.

As the data gives average household income and expenditure on travel, then these can be factored up for the population that may be suffering affordability issues. In many cases this will be the bottom quintile of a city population.

If the data from Table 1 for Mumbai is used, albeit now quite dated, where the poorest quintile pay 23% of their income for transport, and it is assumed that the city has a population of 10 million, then by definition the lowest, poorest quintile is composed of 2 million. If the average annual per capita income in the city is \$8585 and the average annual per capita income for the poorest quintile is 41% of that (or \$2401.78) then their average annual spend on transport will be 23% of that (or \$552.41 per year). In order to improve the affordability by 3% (to the target of 20%) then the per capita subsidy will be equivalent to \$16.58. If the fare subsidy is targeted entirely at the poorest quintile then the subsidy will \$33.14 million per year across the city.

Mumbai Total Population	10 million
Population of poorest quintile	2 million
Average per capita income	\$8585
Per capita income for poorest quintile	\$2401.78
Average expenditure for poorest quintile	23%
Per capita expenditure on transport for poorest quintile	\$552.41
Cash transfer per capita to meet a 3% reduction in expenditure on transport for poorest quintile per capita expenditure	\$16.58
Total cash transfer to meet a 3% reduction in expenditure on transport for poorest quintile	\$16.58 x 2 million people = \$33.14 million



This crude calculation assumes that direct cash transfer can be ‘perfect’ and this can never be the case, but the overall figures appear to be in line with the amount spent in the direct transfer case in Santiago, Chile. In the Chile case 2.2 million eligible households received \$63 million.

Estupinan (2007) conclude that evidence from both the transport sector and other utility sectors show that “only subsidies that are targeted using more sophisticated procedures than mere price reductions have progressive impacts on the income distribution”.



## Conclusions

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This note has sought to set out a range of issues connected with a proposed indicator around the affordability of urban transport. It has highlighted that the interaction between urban transport and urban poverty is multi-faceted of which affordability is just one element. It has sought to show that the interaction is more connected with access to services and opportunities and that thought should be given to a possible access indicator of 'percentage of the population (or the poorest quintile) who can access key services and opportunities in 30 minutes from their homes'. This indicator would also enable integration with an increasing focus on mobile technologies to deliver services and wider urban local economic development efforts. The note highlights that affordability is one area of the challenge for urban transport of low-income communities. It shows that data and methodologies have been developed to understand the issue of affordability across many urban areas of the developing world. However, some of these methods are contested and resource-intensive for regular monitoring. New technologies may offer directions for effective monitoring of urban transport performance for the urban poor. The paper finally, explores possible costs and funding approaches. Actual cost information appears limited in this area, but the note draws on research that argues for direct cash transfer to transport users rather than subsidies to operators as a way forward and an illustrative calculation is made for the scale of costs of such a measure.



## References

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Carruthers, R.; M. Dick and A. Saurkar (2005). Affordability of Public Transport in Developing Countries. World Bank Group Transport Sector Board. January. Washington DC: World Bank Publications.

DFID (2011) Cash Transfers: A Literature Review

<http://www.dfid.gov.uk/r4d/PDF/Articles/cash-transfers-literature-review.pdf>

Diaz Olera, L., Plat, D. and Pochet, P. (2008) Household Transport Expenditure in Sub-Saharan African cities: measurement and analysis. *Journal of Transport Geography* Vol 16, No 8. Pp 1-13

Estupiñán N., A. Gómez-Lobo, R. Muñoz-Raskin and T. Serebrisky (2007) Affordability and Subsidies in Public Urban Transport: What Do We Mean, What Can Be Done? World Bank Policy Research Working Paper 4440

<http://www.dfid.gov.uk/r4d/PDF/Outputs/Transport/C21-wps4440.pdf>

Gómez-Lobo, A. (2007), 'Public Transport Affordability and Subsidy Policies: A case study of Santiago Chile', report prepared for the World Bank.

<http://www.econ.uchile.cl/uploads/publicacion/fc1ab4cf-a506-4d31-832a-8defbdab1515.pdf>

Turner J. and P.R. Fouracre (1995) Women and Transport in Developing Countries *Transport Reviews* 15(1) pp 77-96

Turner, J. (2012) Urban mass transit, gender planning protocols and social sustainability; the case of Jakarta *Research in Transportation Economics* Vol 34 pp 48-53

Turner J. and M. Adzigbey (2012) *Draft Manual for Accessibility Tool for Urban Poor* Draft Manual prepared for UN-HABITAT, Nairobi



## URBAN POOR ACCESSIBILITY ASSESSMENT TOOL

### Proposed approach

#### Appendix 1 Draft Manual for UN-HABITAT Urban Accessibility Tool

### 1. Why Accessibility for the Urban Poor Communities?

As more of the world's population becomes city dwellers, enabling equitable access for city dwellers to everyday services and opportunities will be vital to a city's development and that of the whole nation.

- Half of the world's population currently lives in cities
- It is projected that urban population in developing nations will continue to grow, reaching 80% of the world urban population by 2030.
- By 2020 it is estimated that 889 million people will live in slums.
- In Africa, 6 out of 10 urban resident are currently living in slums, many of these are on very low incomes and
- These informal settlements are frequently characterised by a lack of formal planning in all areas including transport and city authorities and planners frequently lack appropriate resources and tools to manage rapid urbanisation
- A key step to managing rapid urbanization, reducing poverty and addressing equity issues amongst slum dwellers is meeting residents' needs for access to services and opportunities. In discussing equity issues in respect of urban mobility, it is essential to pay attention to issues of accessibility – if the spatial distribution of facilities and services necessary to the functioning of urban households are centralised rather than localised this will necessarily generate increased individual and household mobility in the accessing of them. Travelling to access essential facilities has consequences for household organisation and household organisation has consequences for the undertaking of urban

mobility<sup>2</sup> - patterns of gender differentiation in travel organisation and in the gendered transaction costs associated with urban mobility are now apparent in a wide range of contexts and locations<sup>3 4</sup>.

This Manual describes a rapid assessment tool that draws on widespread availability of new technologies in cities across the developing world to help understand the access needs of low-income city dwellers and involve them in planning & management of city transport. The targeted audience for this Manual includes:

- City Transport Authorities
- Transport Operators
- City Planners & Decision Makers
- Low-income communities
- Civil Society Groups
- Donor Agencies

<sup>2</sup> P.R. Fouracre, M. Sohail, S. Cavill, "A Participatory Approach to Urban Transport Planning in Developing Countries", *Transportation Planning and Technology* 29, no. 4 (2006), 315..

<sup>3</sup> Asian Development Bank 2010 Sustainable transport initiative: operational plan.

<sup>4</sup> [http://www.aecarretera.com/adb/Iniciativa\\_Transporte\\_Sostenible.pdf](http://www.aecarretera.com/adb/Iniciativa_Transporte_Sostenible.pdf)  
Booth, D., Hanmer, L. and E. Lovell, 2000 Poverty and Transport A report prepared for the World Bank in collaboration with DFID Final Report <http://www.odi.org.uk/resources/download/2689.pdf>



## URBAN POOR ACCESSIBILITY ASSESSMENT TOOL

### 2. Objective and actions



Figure 1 SOURCE

*The urban poor accessibility assessment tool allows transport planners and public authorities to map and assess travel patterns (bus routes, walking and cycling paths) of low income communities at a minimum cost using limited number of people and resources.*

While there is a clear need to develop greater understanding of urban mobility and poverty in developing cities, there is also a need to improve the toolkit for professionals to help with this need. Understanding the accessibility needs specific to the urban poor

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require a good deal of data; the frequent lack of this data and the inability of the urban transport planning profession in developing countries to regularly collect such data for low-income communities affects the delivery of accessibility that is affordable, available and acceptable.

Mobile technologies, increasingly available across cities over the world, can now offer a way forward by allowing the rapid cost-effective gathering of data that can aid planning for urban poor communities. They can also work with increasingly widespread participatory approaches to involving urban communities in planning basic services and enable them to generate data that can be used for the planning & operation of urban transport.

The methodology proposed in this manual is intended to be undertaken as a rapid assessment process using limited number of people over a short-period of time and that can identify where more assessment and effort is needed in order to develop robust solutions.

The methodology has a series of objectives which are not intended to be hierarchical but to be considered in an inter-linked and inter-

related manner. Drawing on the work of Carruthers et al<sup>5</sup> these objectives are:

- To gather information on where public transport is **available** in a city and what key basic services and opportunities are **accessible** and understand how that availability and accessibility changes by time of day, by social groups and by route. This information can identify gaps in where public transport is available, where services are accessible and allow us to plan to fill those gaps.
- To gather information from users of different modes on how **acceptable** different means of transport are to different social groups at different times of day. This would include issues of safety and personal security. This information can help improve the quality of public transport
- To calculate and gather information from householders and communities on how **affordable** public transport is in a city. This can help understand the cost of travel to low-income households and

<sup>5</sup> Carruthers, R.; M. Dick and A. Saurkar (2005). Affordability of Public Transport in Developing Countries. World Bank Group Transport Sector Board. January. Washington DC: World Bank Publications.



## URBAN POOR ACCESSIBILITY ASSESSMENT TOOL

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help design financial support if this is an option.

### 3. Estimate of Resources (time, staff, equipment, etc.)

It is estimated that the assessment process requires the following resources:

- It can be undertaken in 10-15 person-days depending on the size of the city.
- It will require at least one GPS tracking device or GPS enabled phone in order to track the public transport routes.
- If GPS-enabled smartphones are to be used, then there are a range of applications (Apps) that can be used to track the path of the person using it. These include RunKeeper ([www.runkeeper.com](http://www.runkeeper.com)) and GPS Essentials ([www.gpsessentials.com](http://www.gpsessentials.com)).
- It will require preparatory work in order to secure the necessary official and community-level approval in order to undertake discussion groups and household surveys in a small number of representative low-income communities.
- Efforts should be made to work with existing participatory urban or community planning processes that may be already happening in the city

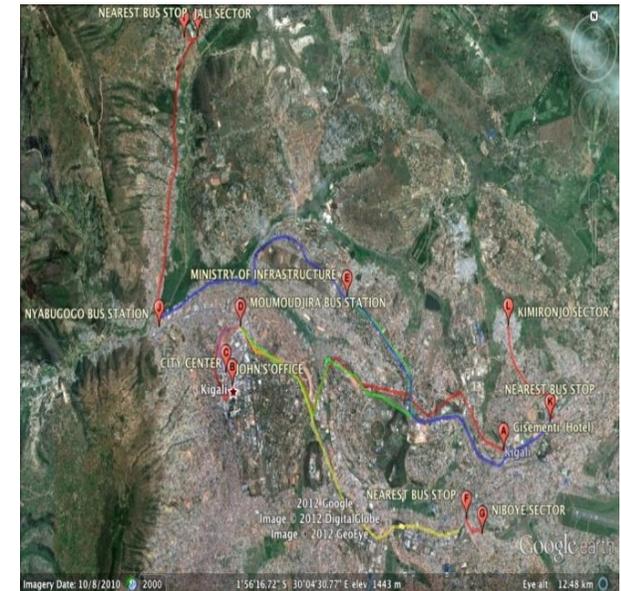
- It will also require preparatory work in order to work with operators associations and community-based NGOs to secure approval to undertaken survey work on public transport or have the work undertaken by authorities that have the legitimacy to undertaken such work.

### 4. Proposed Method

**STEP 1** To use technology to map and measure public transport routes in the city

- First check if there is a map of informal public transport routes
- Chose a route to travel on the informal public transport. The person undertaking the assessment should ride the informal public transport to the end of the route. This is in order to capture whether vehicles terminating early is an issue.
- The surveyor should use a Smartphone GPS or GPS device to record the times of travel and route. This will also give an indication of the waiting time for the return leg.
- At the terminal, the person doing the assessment should get off the vehicle and return on next available informal public transport vehicle to original starting point.

- The GPS tracks can then be mapped onto mapping software such as GoogleEarth or some of the available smartphone applications do that within the application.



**Figure 2: Output from GPS tracking software of some surveyed informal public transport routes in Kigali, Rwanda © UN-Habitat**

**STEP 2** To measure the frequency of public transport and the waiting times for different categories of people to give an indication of passenger journey times and availability



## URBAN POOR ACCESSIBILITY ASSESSMENT TOOL

### Proposed approach

For more information on these methods see: [TRL \(1987\) ORN 4 Field Survey Techniques and Analysis for Urban Bus Operators](#)

### STEP 3



Figure 3: SOURCE

To gather information on how **acceptable** different means of transport are to different social groups. Talking with public transport users as they use the transport system can be useful source of knowledge. This information can help us improve the quality of public transport

- Assessment team members should ask people (from different social groups such as men and women and young and old) travelling on the same vehicle as they are measuring the route for or people waiting at regular vehicle stops what they think of the journey they make and what are the issues or

challenges of using different means of transport. These could include:

- Overcrowding
- Reliability of transport service and occasions when routes are terminated short or deviate from route
- Procedures for carrying loads such as from market or to supply small businesses (cost, acceptability etc)
- Attitudes of operators to passengers
- Personal safety
- Personal Security and Harassment



Figure 4 Overcrowding of Chapas in Nampula, Mozambique © UN-Habitat

- They should try to ask about times when there are more issues than normal
- Assessment teams should try and find passengers attitudes about
  - Informal public transport

- The person undertaking the assessment should also keep a record of the frequency of vehicles along the same route as being measured in Step 1.
- This can be measured by recording the departure time from the original boarding point of each informal public transport vehicle going along the same route. Recording frequencies at different times of day (especially between day and night) and between dry and rainy periods should also be conducted
- They should measure waiting times at the stop by recording the arrival time of a randomly chosen person at the stop and the time that person leaves on an informal public transport vehicle and repeat this for 15-30 minute period at depending on how busy the stop is and at different times of the day and week
- There is often anecdotal evidence that people carrying loads, older people and women with children often have a much more negative waiting experience when using informal public transport and this experience varies over the day and by season. Care should be taken to record the waiting times for different groups of passengers.



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- Formal transport (where it exists) or larger informal public transport (if they exist)
- Informal Motorbike/Bike taxis or shared taxis (if they operate in the city)
- Assessment teams should also ask about the cost of travel, when they change vehicles (if at all) whether that incurs extra cost and how?

**STEP 4** To gather information from householders and communities on how **acceptable** different means of transport are to different members of the household. This would include issues of safety and personal security

- The Assessment Team should ask members of the households they are interviewing what they think of the journey they make and what are the issues or challenges of using different means of transport. This should include travel around the neighbourhood and outside.
- The Assessment Team should be aware that they are trying to gather information from different members of a household. They should secure community agreement to allow the less-frequently heard voices to be spoken (particularly

- women, children and young people, older people, people with disabilities).
- The Assessment Team should ask about times of day or year when there are more issues than normal
  - The Assessment Team should find out people's attitudes about
    - Walking in the neighbourhood
    - Informal public transport
    - Formal public transport (where it exists)
    - Informal Motorbike or bike taxis
    - Other means of transport
  - The Assessment Team should ask about times when different members of the household have felt unsafe and why, either travelling in the neighbourhood and why?



Figure: SOURCE Author

- The Assessment Team should ask the household members what do they do to avoid feeling unsafe?

**STEP 5** To calculate how **affordable** public transport is in the city.

This step is a desk-exercise and can be carried at any time during the assessment process.

- The form of the Affordability Index<sup>6</sup> is relatively simple, and the data for its compilation is relatively easily available:

Affordability Index =

$$\frac{\text{Number of trips} \times \text{Average cost per trip}}{\text{Per capita income}} \text{ expressed as a \%}$$

In order to calculate it the Assessment team need to:

- Find the average per capita monthly income and the average for the bottom quintile of the income distribution, for the city;

<sup>6</sup> Carruthers, R.; M. Dick and A. Saurkar (2005). Affordability of Public Transport in Developing Countries. World Bank Group Transport Sector Board. January. Washington DC: World Bank Publications.



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- Determine the minimum public transport fare to travel 10km using a daily ticket
- Calculate the cost for 60 trips at this fare;
- Express this cost as a percent of the average and bottom quintile monthly incomes.

**STEP 6** To ask householders and communities about how easy it is to access different parts of the city and how does that change with time of day and season



**Figure 6: SOURCE Author**

- Using a city map, knowledge of where the low-income and informal settlements are located in the city and the information on access and reliability of

informal public transport gained from Steps 1-4 a small number of low-income communities should be chosen to be surveyed for information on access issues for low-income communities in the city.

- Communities should be chosen to illustrate the range of conditions found across the city and could include some low income communities that are centrally located as well those on the periphery and well-established neighbourhoods as well newly-established informal settlements.
- The Assessment team should travel to these communities and secure official and community-level approval to undertake household interviews.
- Community-level initiatives to promote participation in urban development should also be partnered with and built upon so as to build on existing knowledge and not to duplicate effort.
- The Assessment Team should construct rapid maps of regular travel routes across a neighbourhood by giving GPS-enabled devices to community members or by Assessment Team members walking with community members to track walking or non-motorised transport routes to key services such as public transport, toilets, health facilities and schools, markets and places of worship. The Assessment Team should make sure that men and women, young and older people are represented as different groups may use different routes for personal safety reasons. Differences in routes by time of day should also be recorded and asked about.
- The Assessment team should ask a small number of households some questions about access to different services
- The Assessment Team should ask about how do they access
  - Place of work
  - Places of worship
  - Toilets & Latrines
  - Health centres
  - Major markets
  - Hospital
  - Schools.
- The Assessment should also ask – “When does it become more difficult to access these places.....”
  - Place of work
  - Places of worship
  - Health centres
  - Major markets
  - Hospital



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- Schools.
  - The Assessment Team should ask “are there times when they need to travel with goods? How is it to travel with goods and what issues do they face?”
  - The Assessment Team should ask – “Are there any times when you don’t make journeys even if you have to and why?”
  - The Assessment Team should ask different household members the same question as young people and old people may have different answers; men and women will also have different answers.
  - Different household members should be encouraged to speak by including women in the Assessment teams, by making it clear in community consultation that all household members have a voice and by interviewing people separately from the household setting.
- Further information is available on a range of community-level survey techniques, including [Women’s Safety Audit](#) and [Participatory Methods](#) that can be used to gather information from households and residents see:???
- STEP 7** To understand how **affordable** public transport is in a city
- As the community-level surveys are being undertaken, the Assessment Team should also ask different household members how much they spend every month or week on travel.
  - The Assessment Team should be aware that research shows that not all members within a household have equal access to money within the household. There is a possibility that certain household members (e.g. women and young people) may not have equal access to money or household assets such as bicycles, motorbikes or cars
  - The Assessment Team should ask different household members what happens if there is not enough money for everybody to make the journeys they want and which journeys, made by whom get priority
  - The Assessment Team should ask different household members whether there are any differences in how much it costs to travel and how much are these differences.
  - The Assessment Team should ask different household members about if and when they travel with goods or “if they have to travel with goods how much does this cost? Does this cost vary and how?”

### **STEP 8** Monitoring & Evaluation Framework

Objectives	Indicators
<b>Affordability of Travel</b>	<ol style="list-style-type: none"> <li>1. Affordability index (local currency) by different social groups within households</li> <li>2. Portion of individual income spent on travel monthly or daily (local currency) variation by women and men, as well as young and old</li> </ol>
<b>Availability of Public Transport (measuring frequency of PT)</b>	<ol style="list-style-type: none"> <li>1. Map of informal services</li> <li>2. Distance travel to reach nearest bus stop (km/miles)</li> <li>3. Waiting time at bus stops (minutes / hours) and variation by time of day and by different social groups</li> <li>4. Frequency of buses serving the same route (minutes/hours) and variation across day &amp; night and wet and dry season</li> </ol>
<b>Acceptability of Public Transport services</b>	<ol style="list-style-type: none"> <li>1. Overcrowding (ratio of the number of passenger to vehicle capacity)</li> <li>2. Maps of route termination</li> <li>3. Route cutting (percentage of services that terminate early) and variation across time of day</li> <li>4. Load carrying (cost to passenger of travelling with loads)</li> <li>5. Additional cost incurred for safety and personal security (local currency)</li> </ol>
<b>Access within community</b>	<ol style="list-style-type: none"> <li>1. Does community report whether it is safe to walk across neighbourhood? (variation by social group and by day/night and to location)</li> <li>2. Maps of walking and non-motorised transport routes to key services across neighbourhood for different social groups</li> </ol>

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## URBAN POOR ACCESSIBILITY ASSESSMENT TOOL

### 5. Solutions

There have been a range of tools developed that focus on the improvement of informal public transport, regulation of motorbike taxis and improvement of walking and cycling environments. Some of these include:

- Partnership on Sustainable Low-Carbon Transport ([SLOCAT](#)). This is an international partnership to advocate for policy responses, share research and best practice on the promotion of urban transport in developing countries. It has a particularly focus on Asia and Latin America.
- GIZ funded Sustainable Urban Transport Project ([SUTP](#)): This is a web-based project to develop practice and professional capacity on delivering sustainable urban transport. It provides a coherent practitioners manual on implementing measures around urban planning for formal public transport and non-motorised modes in an Asian context.
- [EMBARQ](#). This is an initiative of the US-based environmental think-tank, the World Resources Institute. It provides advocacy material for sustainable urban transport in a range of transition

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economies, particularly in Latin America and Asia.

- Institute for Transport & Development Policy ([ITDP](#)). ITDP is a US-based environmental think tank that advocates for sustainable urban transport globally. The website provides advocacy material and practical guidance, for promoting urban cycling and implementing bus-rapid transport. It also provides a regular magazine and useful news of developments globally.
- In some regions, animal-drawn transport also offers urban access solutions and more information can be found at: [www.animaltraction.com](http://www.animaltraction.com)

### 6. Case studies

The proposed tool was piloted in Nampula, Mozambique and Kigali, Rwanda with the generous assistance of city and provincial authorities, bus union representatives and public transport operators and users. A workshop was held in each location to discuss the data recorded through the above mentioned process.

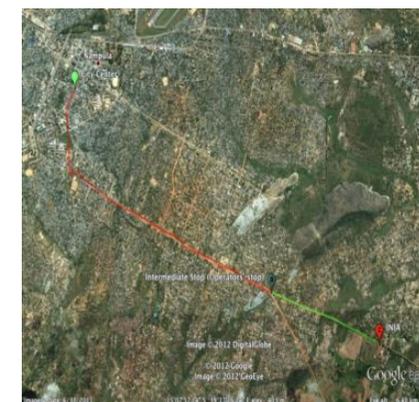


Figure 2: Mapping by participants of Nampula workshop of an informal public transport route that terminates before its planned destination. The red route shows the journey made using the chapas and the green route, leading to the community, was made by foot. The distance from [BC] is 1.83 km

In Nampula for example, it became clear from the GPS tracking and from the public transport field exercises that there is a problem of informal public transport (chapas) terminating short of the official route terminus.

The operators' behaviour had an impact on passengers living in peripheral communities causing them to walk considerable distances and/or paying twice to change onto another operator that would take them all the way,



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including the extra time needed to step down from one vehicle to another.

#### SOLUTION-

- Users should be involved on reporting on the performance of operators to enable better enforcement.
- Promotion of regulated motorbike taxi services within neighbourhoods
- A 'Green Line' telephone service to be set up by the city council to enable people to report operator practices such as terminating routes.
- Ways of using mobile phone technology to capture problems in the system should be explored.

#### The Rwanda Case



The Assessment pilot in Kigali found that the outskirts of the city are not well served. People are in desperate needs of public transport reaching and serving their settlements. GPS tracking of bus routes to three low income settlements on the edge of the city showed that communities can be as far as 1.83 km away from the nearest bus stop.

**SOLUTION-** extending public transport services to acceptable walking distance (400-600 meters) to the settlements would greatly reduce transportation costs.

### Appendix 1 – Assessment Team Training Workshop Material

- Agenda
- Overview
- Group Discussion on Urban Poor & Accessibility Methods
- Field Exercise on Measuring Public Transport Accessibility
- Field Exercise on Asking Communities about Accessibility
- International Examples of Good Practice