

# TRANSPORT EXPENDITURE: IS THE 10% POLICY BENCHMARK APPROPRIATE?

C VENTER<sup>1</sup> and R BEHRENS<sup>2</sup>

<sup>1</sup>Dept. of Civil and Biosystems Engineering, University of Pretoria, Pretoria, 0002.

Tel: +27 (0)12 420 2184. Fax: +27 (0)12 362 5218 (Corresponding Author).

E-mail: [christo.venter@up.ac.za](mailto:christo.venter@up.ac.za)

<sup>2</sup>Dept. of Civil Engineering, University of Cape Town, Private Bag, Rondebosch 7701.

Tel: +27 (0)21 650 4757. Fax: +27 (0)21 689 7471. E-mail: [rbehrens@ebe.uct.ac.za](mailto:rbehrens@ebe.uct.ac.za)

## ABSTRACT

Understanding and measuring the transport expenditure patterns of households is critically important for formulating and monitoring the effectiveness of transport policies. Current government policy emphasis on transport affordability and poverty relief, together with a reconsideration of public transport subsidisation, makes a critical review of benchmarks and objectives around transport expenditure timely. The paper takes a critical look at current notions of affordability within the policy framework – particularly the 1996 White Paper objective that less than 10% of commuters' disposable income should be spent on transport. Considering its original intent, conceptual problems and methodological difficulties, the 10% benchmark appears to be misapplied in current South African policy and practice. Empirical evidence from recent data supports this conclusion. The paper highlights the need for a more nuanced understanding of the notion of affordability from the user's point of view, to improve the accuracy and policy relevance of the transport expenditure indicators being used.

## 1. INTRODUCTION

Passenger transport policy formulation requires accurate data on transport expenditure for numerous reasons. These include: to identify (and monitor) those sectors of the passenger market in greatest need of State assistance; to inform the setting of public transport subsidies and fares to provide this assistance; and to analyse and monitor the user cost impacts of transport policies or interventions across all user groups and modes in order to understand, for instance, how to use fare policy to support greater use of non-car modes among choice passengers. This paper was motivated by a concern that the transport expenditure indicators prescribed in current policy documents are unable to provide sufficiently meaningful information upon which to undertake the above. It is the authors' contention that the current policy benchmark is blunt, ambiguous, and difficult to measure. The purpose of this paper is to review and critique current transport expenditure indicators prescribed in policy, and to discuss how these might be improved. The paper is divided into five sections. The following section discusses prescribed policy indicators. Section 3 reviews available transport expenditure data. Section 4 discusses conceptual and measurement problems with current indicators. Improvements are suggested in the final section.

## 2. PRESCRIBED POLICY INDICATORS OF TRANSPORT EXPENDITURE

The National Land Transport Transition Act (22 of 2000) reflects the emphasis of current government policy on transport affordability and poverty alleviation. Section 4(1) includes among the principles applying to the determination, formulation, development and application of land transport policy, that public transport services “(i) are aimed at providing *affordable transport* to the public; [and] (vi) are planned where possible so that *subsidies are aimed to assist currently marginalised users* and those who have poor access to social and economic activity” (RSA, 2000, emphasis added).

The earlier White Paper on National Transport Policy (1996) specified a measurable ‘customer-based strategic objective’ “[t]o ensure that public transport is affordable, with commuters spending less than about 10 percent of disposable income on transport”. Directly drawing on this objective, the National Land Transport Strategic Framework (2002-2007) specified a ‘customer-based key performance indicator in the form of the “% of households spending more than 10% of disposable income on public transport”.

The origin or rationale of the 10% value is not specified explicitly in any of the policy documents. It appears to originate from a 1987 World Bank report entitled “Bus services: Reducing costs, raising standards” (Armstrong-Wright and Thiriez, 1987). The authors state that “in developing countries, a reasonable level of household expenditure on bus travel should not exceed 10 percent of household income,” based on their general observations regarding what is needed for bus operators to satisfy users’ expectations while remaining financially viable. The 10% level was evidently meant as a subjective benchmark for assessing the performance of bus operations, based on the income levels of bus users and the financial performance specific to the cases reviewed by the authors. The study did not suggest that the same value be applicable to other modes, nor that it be used as a strict benchmark for assessing affordability issues or the need for subsidisation.

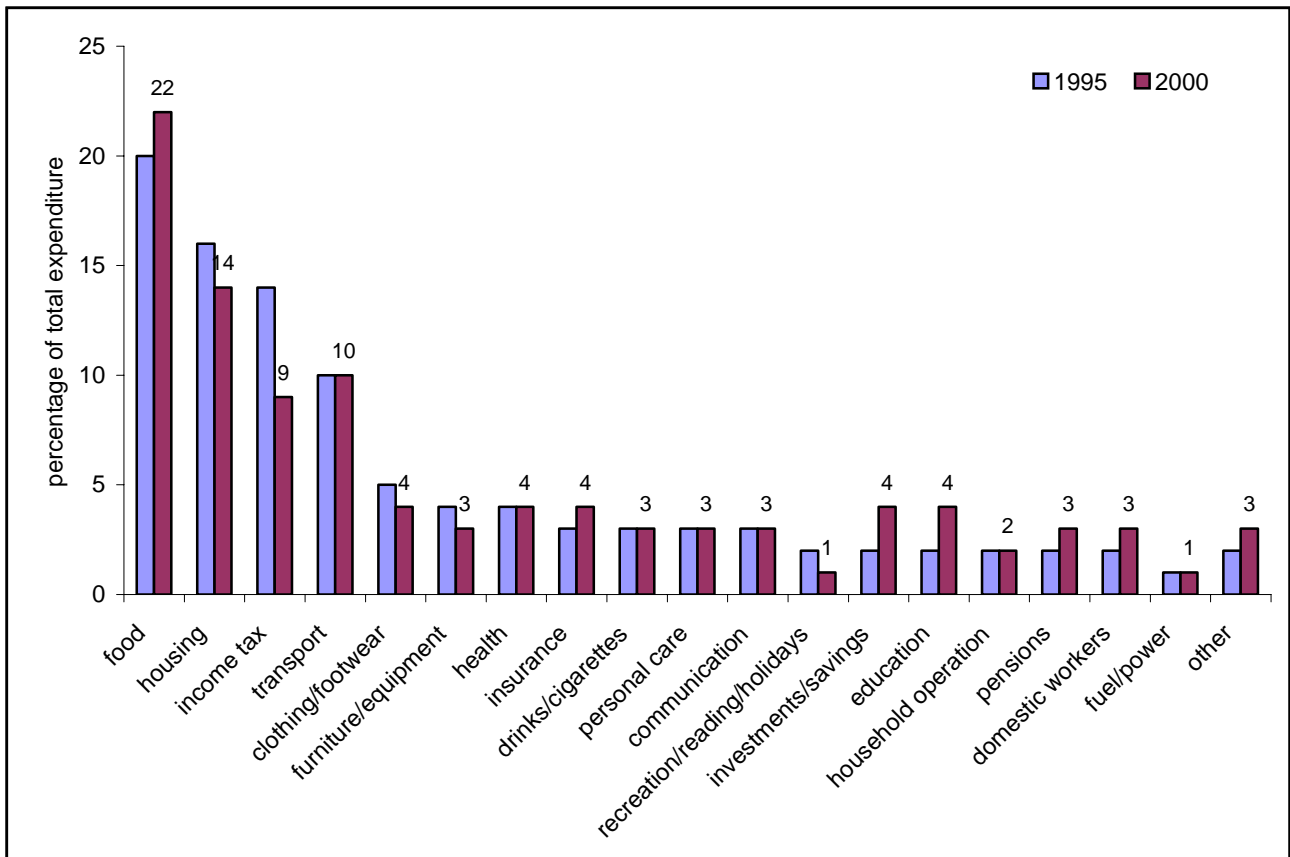
The lack of clarity about the intent of the 10% benchmark value has led to differing definitions and interpretations. For example, the following recent Integrated Transport Plans reveal definitional discrepancies in their application of the measure:

- The City of Johannesburg (ITP, 2003) reported the % of *commuters* (all modes) spending more than 10% of *personal* income on the *peak hour* work trip only;
- Sedibeng District Municipality (Gauteng) (ITP, 2004) reported the same measure, but only for *public transport commuters*; and
- Bojanala District Municipality (North-West) (ITP, 2003) reported the % of *households* spending more than 10% of income on transport (all modes).

Such differences in the application of the benchmark make systematic monitoring of the achievement of government objectives very difficult.

## 3. CURRENT SOUTH AFRICAN DATA ON TRANSPORT EXPENDITURE

In the absence of the release of the 2003 National Travel Survey data, recent national data on transport expenditure take the form of the 2000 Income and Expenditure Survey conducted by Statistics South Africa. The survey provides data on household expenditure on selected categories of goods and services. These data indicate the relative importance of transport costs in the household budget. About 60% of household expenditures went towards paying for four items – food, housing, income tax, and transport (see figure 1).

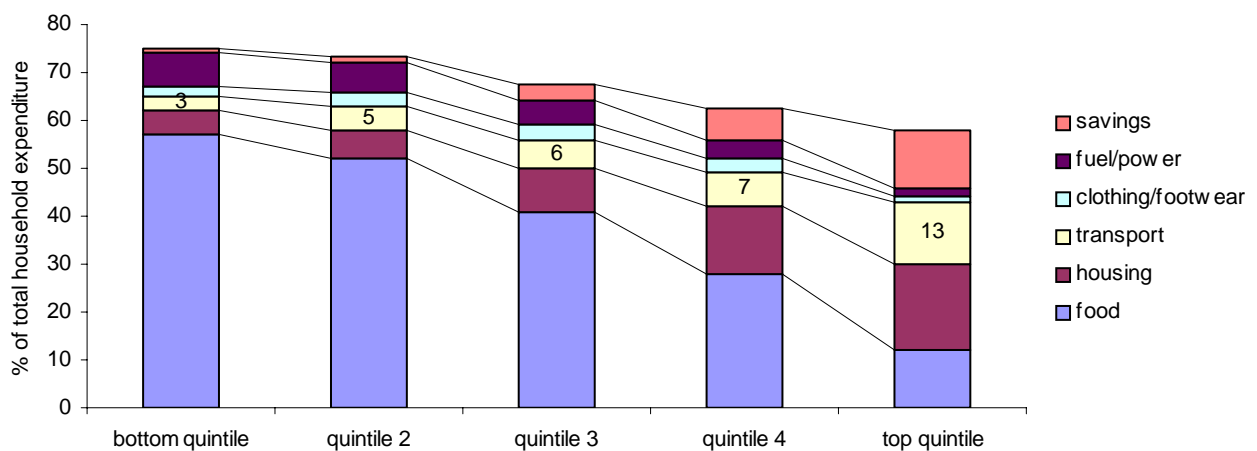


Source: Stats SA, Income and expenditure survey: 1995 and 2000

**Figure 1. Percentage of total household expenditure for selected categories of goods and services (1995, 2002).**

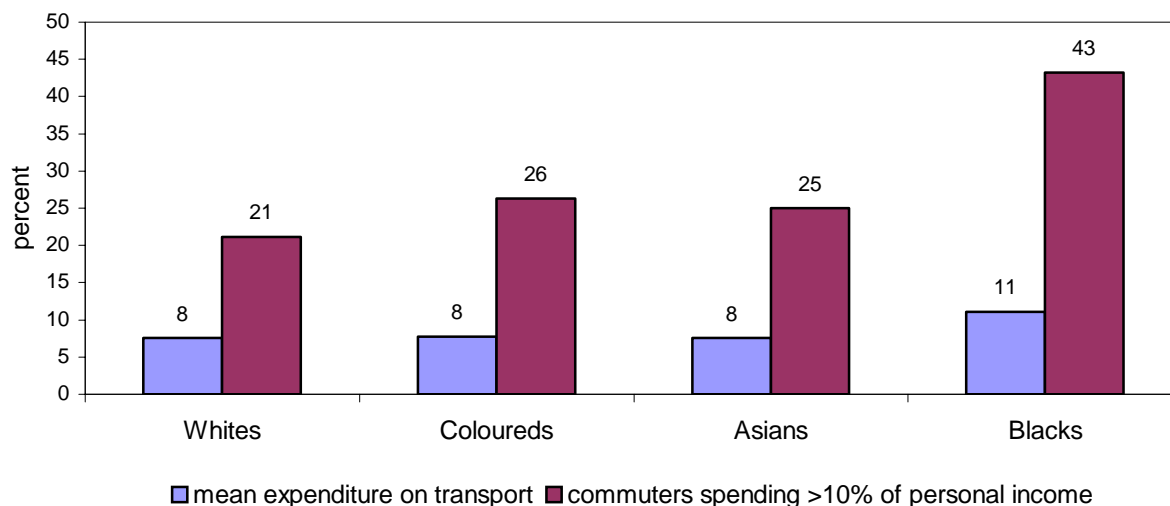
Comparison with 1995 expenditure data suggests that transport's contribution has remained constant between 1995 and 2000, at 10%.

This average figure masks significant differences across subgroups, however. Figure 2 shows that the proportion of expenditure on transport increases steadily from about 3% for the poorest fifth, to about 13% for the richest fifth of South African households.



Source: Based on Stats SA, Income and expenditure survey: 1995 and 2000

**Figure 2. Proportion of total household expenditure for selected categories of goods and services, 2000.**

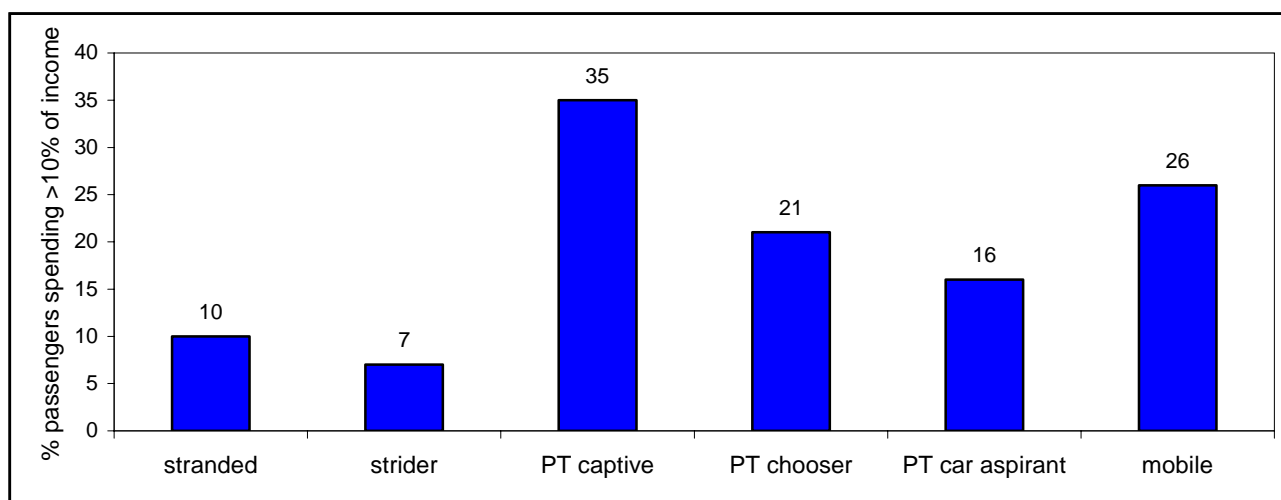


Source: National Passenger Panel 1992

**Figure 3. Percentage of personal income spent on commuter transport by race (1992, n = 3,618 commuters).**

When focussing only on *commuter* transport, and collecting data on a *person* rather than household basis, the opposite trend emerges. Assuming race to be an adequate proxy for income, earlier data on commuter transport expenditure collected in the Department of Transport’s 1992 National Passenger Panel suggest that the poor spend relatively *more* on transport than the wealthy (see figure 3). The definitional differences between the two datasets unfortunately does not allow a direct comparison to establish some form of longitudinal trend.

Intergroup differences in transport expenditure patterns are also observable in relation to mode use and availability, rather than income. Earlier analysis of transport expenditure, undertaken as part of the urban passenger ‘customer segmentation’ during the Moving South Africa study, indicated that the ‘public transport captive’ segment spend relatively more than other segments on transport – 35% of passengers within this segment were estimated to spend more than 10% of their disposable income on travel in 1995 (see figure 4) (TRC Africa, 2000).



Source: Strategic customer-based passenger transport information project (TRC Africa, 2000)

**Figure 4. National urban passenger ‘customer segments’ and percentage of passengers paying more than 10% of disposable income on transport (1995 ohs, n = 30 000 h).**

Notwithstanding differences in measurement, the mean expenditure on transport amongst poor Black commuters in South Africa of around 11% is broadly consistent with the findings of expenditure surveys in other African cities (see Table 1). Table 1 illustrates, however, that the available African city data on relative household expenditure on transport vary considerably.

**Table 1. Proportion of total household expenditure allocated to transport in African cities.**

City	Survey	Date	% spent on transport
Abidjan	Enquête Budget-Consommation	1979	8.5
	Enquête Niveau de Vie	1995	11.9
	Enquête UEMOA sur les Dépenses des Ménages	1996	9.5
Bamako	Enquête sur les Dépenses des Ménages Urbains	1985-86	15.1
	Enquête Budget-Consommation	1988-89	14.6
	Enquête UEMOA sur les Dépenses des Ménages	1996	11.2
Cotonou	Enquête Budget-Consommation	1986-87	10.2
	Enquête Légère sur les Activités Economiques des Ménages (ELAM 5 bis)	1996	22.1
	Enquête UEMOA sur les Dépenses des Ménages	1996	9.8
Dakar	Enquête Sénégalaise auprès des Ménages	1994-95	6.8
	Enquête UEMOA sur les Dépenses des Ménages	1996	8.2
Dar es Salaam	Human Resources Development Survey	1993	9.1
Douala	Enquête MAETUR	1978	8.0
	Enquête Budget-Consommation	1983-84	9.0
	Enquête Camerounaise auprès des Ménages	1996	12.1
	Enquête Dépenses des Ménages	2000	16.0
Kampala	National Household Survey	99-2000	9
Kinshasa	Enquête Consommation	1969	4.4
	Enquête Consommation	1975	7.4
	Enquête Budgets des Ménages	1986	9.4
Lagos	Consumer Expenditure Survey	1985-86	0.9
	Consumer Expenditure Survey	1992-93	3.7
Mombasa	Welfare Monitoring Survey	1997	4.5
Nairobi	Welfare Monitoring Survey	1997	7.6
Ndjaména	Enquête Conditions de Vie des Ménages	1990	6.8
Niamey	Enquête Budgets Familiaux Africains	1961-62	5.3
	Enquête sur la Consommation de Produits Essentiels	1986-87	8.7
	Enquête Budget-Consommation	1989-90	15.2
	Enquête Permanente de Conjoncture Economique et Sociale	1995	13.4
	Enquête UEMOA sur les Dépenses des Ménages	1996	11.8
Yaoundé	Enquête Rapide sur la Consommation des Ménages à Yaoundé	1993	14.8
	Enquête Consommation 1-2-3	1993	16.8
	Enquête Camerounaise auprès des Ménages	1996	13.8
	Enquête Dépenses des Ménages	2000	18.3

Source: Diaz Olvera *et al* 2004

The foregoing review of available transport expenditure data illustrates that while mean expenditure is on or near the 10% policy benchmark, large numbers of households or individuals (depending on the particular indicator definition used) spend proportionately

more than this. Despite available data that are scarce and inconsistent in terms of definitions applied, it does appear that both the poor and wealthy can exceed the 10% expenditure benchmark. This introduces great difficulties in linking transport expenditure to notions of affordability, as the following section illustrates.

#### 4. PROBLEMS WITH SOUTH AFRICAN TRANSPORT EXPENDITURE INDICATORS

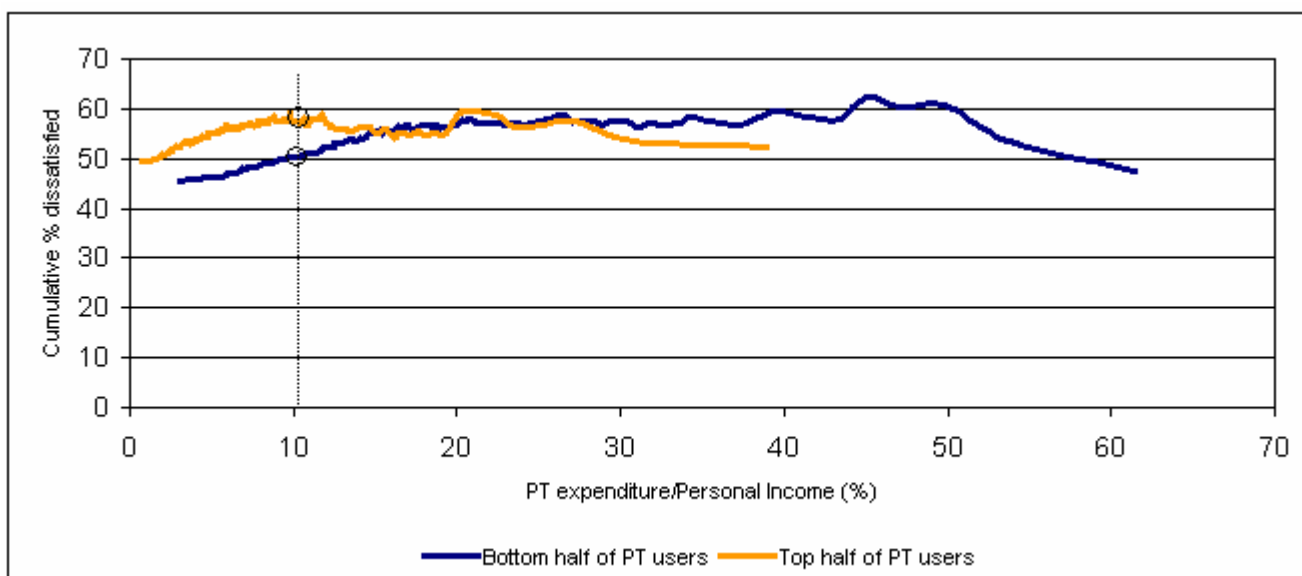
Problems with transport expenditure indicators, and the use of the 10% benchmark to provide policy guidance on the affordability of transport, can be categorised into two groups: conceptual problems and measurement problems.

##### 4.1 Conceptual Problems

###### 4.1.1 Inappropriateness of Using a Single Benchmark

An indicator based on a fixed proportion of household expenditure across an entire population fails to recognise that 'affordability' may have a different meaning to different households. 'Affordable' transport expenditure measured as a percentage may systematically vary with, for instance, a household's location and income.

This is illustrated by evidence from Johannesburg drawn from the 2002 Household Travel Survey conducted by the Gauteng Department of Public Transport, Roads and Works. The level of dissatisfaction expressed by public transport users with the fares they pay is used as an indicator of the affordability of public transport. Work trip expenditures for the morning peak are converted to a proportion of monthly personal income. Figure 5 shows, for all public transport users *at or above* a given expenditure/income ratio, the cumulative percentage of public transport users who were dissatisfied with the affordability of their mode. The two curves are for users respectively above and below the median income level of R1500.



Source: Gauteng Household Travel Survey, 2002 (Johannesburg data)

**Figure 5. Cumulative % of public transport users dissatisfied with transport costs, vs. Proportional expenditure ratio (n=4082 individuals).**

Of those spending 10% or more of their income on transport to work, 50% of the lower income group and about 58% of the higher income group are dissatisfied with transport costs. This is counter-intuitive, as one would expect poorer people to be more dissatisfied with high proportional public transport costs. In fact this discrepancy is observable for

proportional fare expenditures up to 15% of personal income.

We clearly know little about the affordability expectations of different types of transport users. In light of this observation the use of a single transport expenditure benchmark seems both crude and inappropriate.

#### *4.1.2 Inability to Provide Clear Policy Guidance*

It is Not Always Clear Whether the Household or Individual Spending More Than the Specified Indicator (E.G. 10%) is Better or Worse Off from a Welfare Perspective. This Causes Ambiguity Over Whether Government Policy Should be Aimed at Lowering or Increasing the Number of Households Falling Above the Benchmark Level

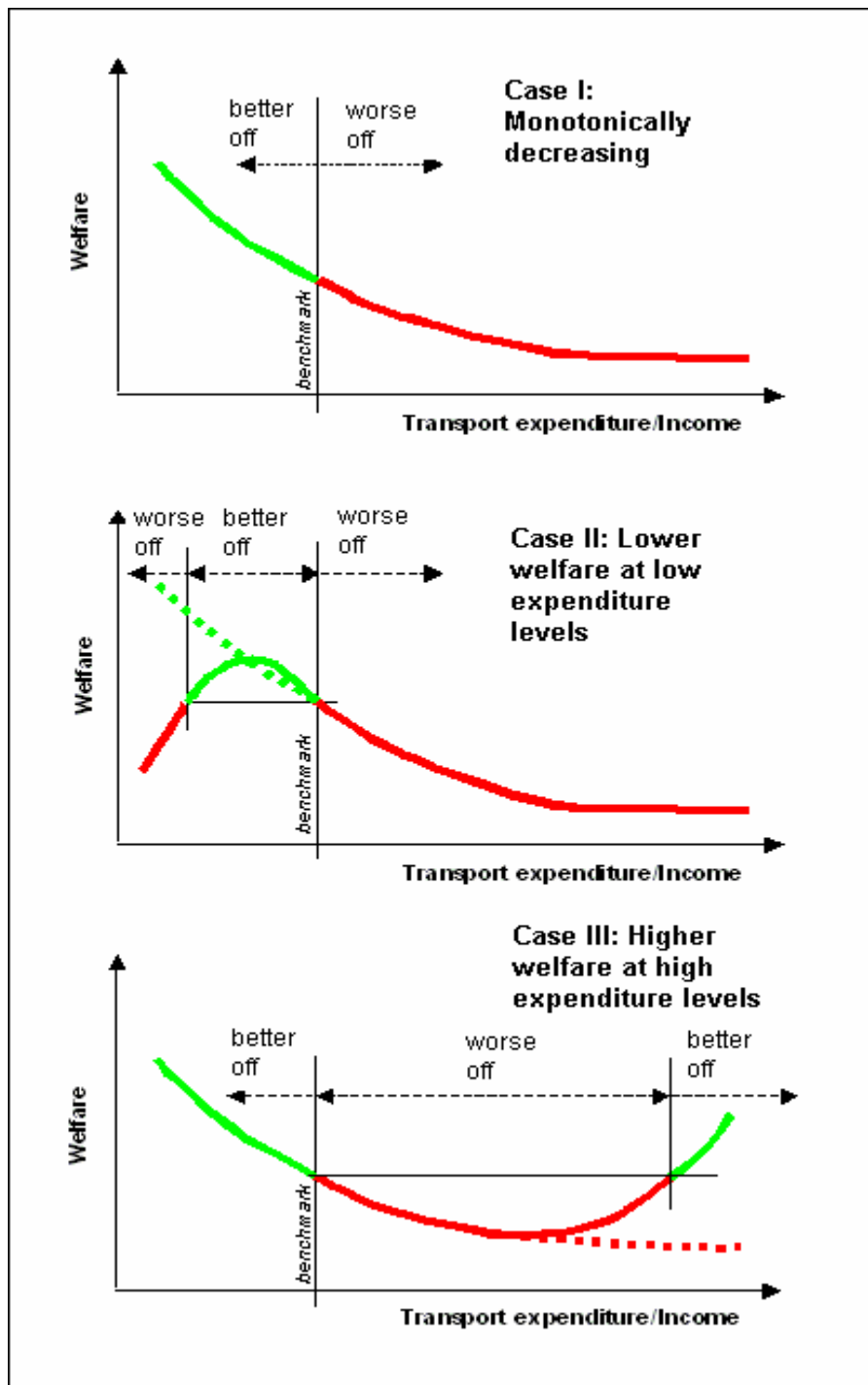
Theoretically, in order to use the proportional expenditure on transport as an unambiguous benchmark indicator, its distribution must be monotonic with respect to some measure of welfare. In other words, as the proportional expenditure on transport increases, the welfare of consumers must decrease (or at most remain constant). Only if this condition is met, can one confidently say that by moving some consumers from above the benchmark to below the benchmark, are we improving their welfare.

Figure 6 illustrates this notion diagrammatically. Case I is the one described above. It can be seen that, regardless of what specific value is chosen for the benchmark, monotonicity of the proportion expenditure vs. welfare curve will guarantee that the benchmark will distinguish correctly between better-off and worse-off consumers.

However, Cases II and III illustrate what happens when the curve is not monotonically decreasing over its whole range. In Case II, the curve bends downwards for low values of the proportion expenditure, so that some subsection of consumers are worse off than their position below the benchmark would suggest. In Case III, the curve bends upwards at high values of the proportion expenditure, making consumers in this region better off than their position above the benchmark suggests.

Empirical evidence suggests that the problematic cases (II and III) correspond to real-world situations.

- CASE I: Evidence of monotonicity: Public transport users. Figure 5 showed that, when considering only public transport users with low incomes in Johannesburg, their dissatisfaction with fare levels generally increases with the share of income spent on public transport trips to work. We cannot measure welfare directly, but use travellers' stated dissatisfaction with the affordability of public transport as a surrogate indicator of welfare. The relationship is strictly monotonic for proportion expenditures up to about 20% of income, then remains more or less constant up to expenditure levels of about 40% of income. Beyond 40%, the sample becomes too small to be interpreted with confidence. In general, the graph suggests the kind of monotonicity needed for the use of a benchmark based on the proportional public transport expenditure to be valid for this group.
- CASE II: Evidence of non-monotonicity: Captive walkers. Figure 4 showed that people walking to work ("striders") tend to spend little on transport. This is not in itself a problem, as it is economically rational for commuters to select the least cost mode as their incomes drop. Figure 7 shows that in Johannesburg the incidence of walking is at least twice as high for people in the lowest income quintile than for other groups.



**Figure 6. Theoretical requirements and problems with the proportional expenditure indicator.**

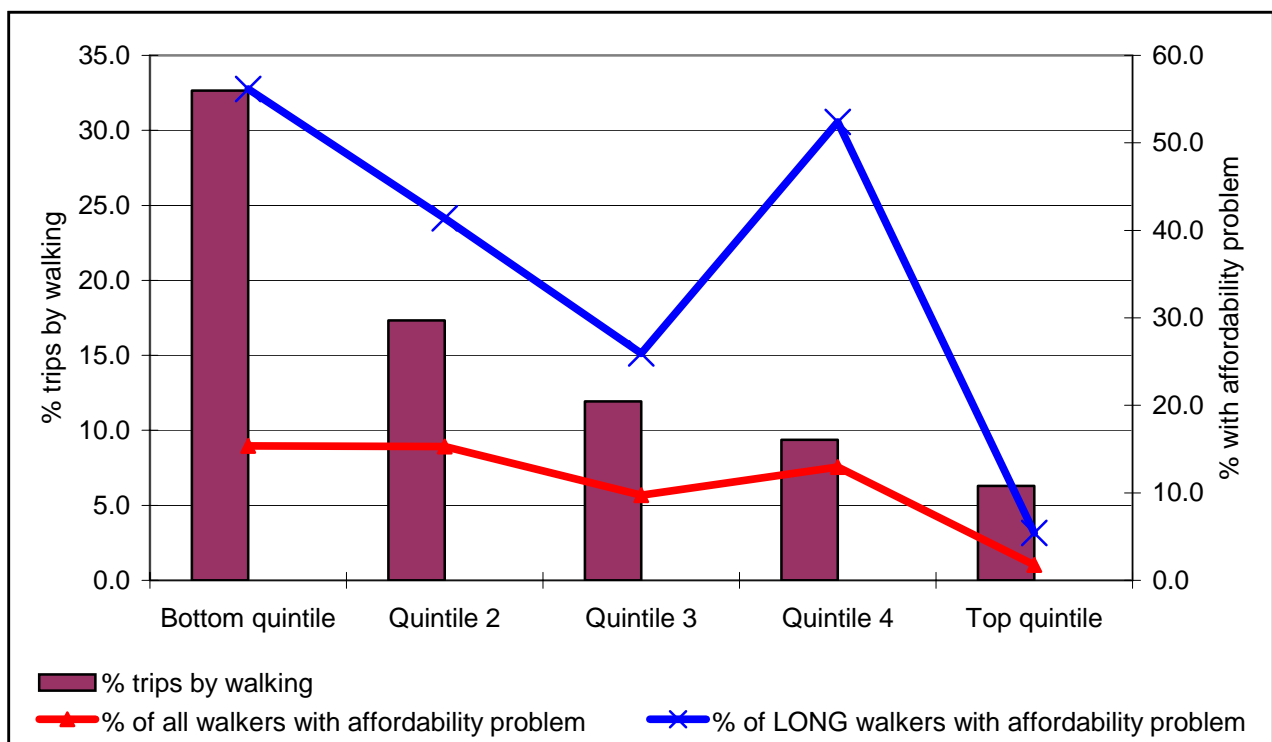
However, there is also evidence to suggest that many low-income walkers are forced by affordability constraints to travel for *longer distances than is desirable*, thus incurring additional non-monetary costs such as exhaustion and reduced productivity at work. These “non-transport” costs can reduce the actual welfare of walkers significantly below the levels suggested when considering their monetary transport expenses alone.

For instance, it appears that affordability problems force many people in the lower income quintiles to walk for long distances – defined as a trip of more than 30 minutes one-way,



which is twice the acceptable distance promoted by the White Paper<sup>1</sup>. In the bottom quintile, 56% of people who walk for more than 30 minutes (“LONG walkers” in Figure 7) also say they have affordability problems, compared with less than 20% for all walkers in this income quintile.

It is thus misleading to conclude that everybody with proportional transport expenditures below a certain level (such as 10%) are better off than those above the benchmark. *Observed transport costs* are not equivalent to *generalised transport costs*, which would be a better indicator of affordability. Given the high incidence of walking in both urban and rural areas in South Africa, especially for non-work trips (Behrens, 2004) the skewing effect could be considerable. Moreover, in extreme cases unaffordability of transport could lead to trips being completely foregone, with resultant welfare reduction effects that an indicator based on expenditure alone is unable to capture. Clearly the *actual consumption of transport* – and any measure based solely on it – is not an adequate reflection of its affordability.

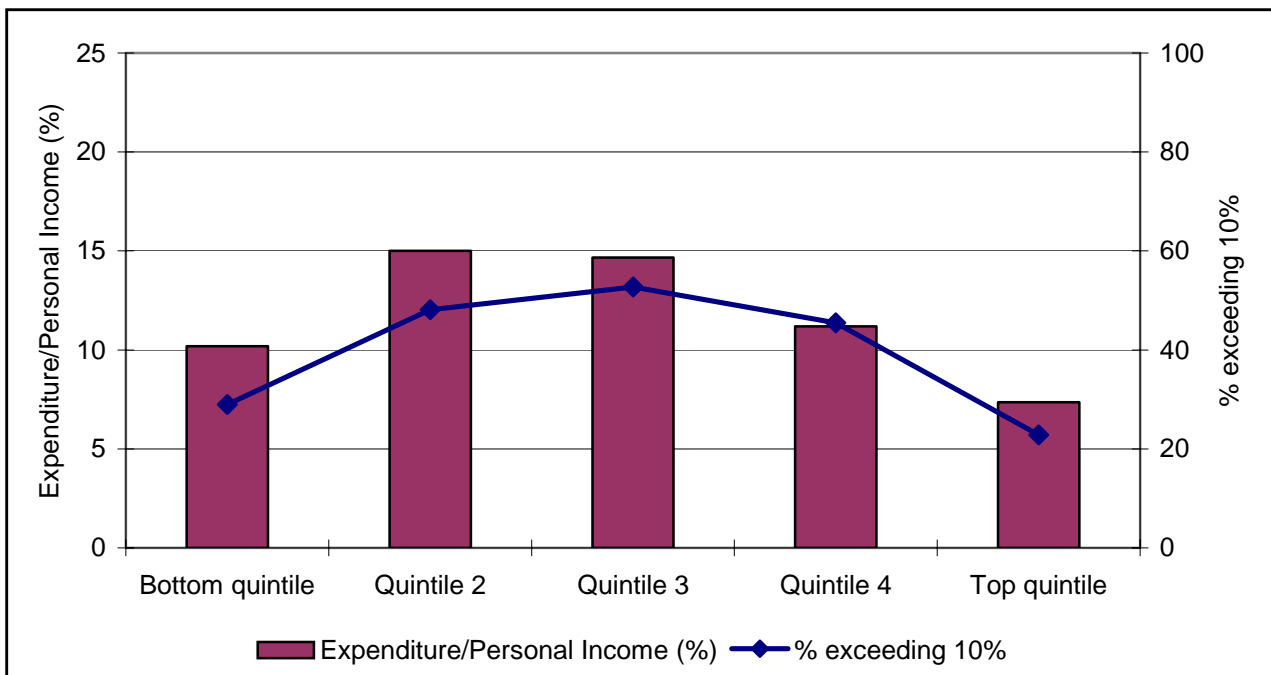


Source: Gauteng Household Travel Survey, 2002 (Johannesburg data)

**Figure 7. Walking to work and affordability vs. Income.**

- **CASE III: Evidence of non-monotonicity: New car owners.** Car ownership’s high fixed costs make the mode by and large unavailable to low income households; however, once incomes rise beyond a certain threshold, consumption of car transport increases fast due to its perceived benefits. The expenditure/income ratio of car users can therefore be expected to be high just above the threshold, eventually flattening out as incomes rise faster than car use. In this case a high proportional expenditure on transport does not necessarily indicate lower welfare nor unaffordability of transport, but rather (as long as lower-priced options such as public transport are available) increased consumption of a superior good beyond the satisfaction of basic needs.

<sup>1</sup> The White Paper on National Transport Policy (1996) recommends a maximum walking distance of about one kilometre in urban areas. Assuming a walking speed of 4 km/h this corresponds to a travel time of 15 minutes.



Source: Gauteng Household Travel Survey, 2002 (Johannesburg data)

**Figure 8. Proportional expenditure vs. Income, for car modes to work (n=3492 individuals).**

Figure 8 illustrates this case for Johannesburg: the proportional expenditure for work trips by car (including trips as passengers and in lift clubs) is not monotonic but peaks for middle-income groups. About half of these respondents spent more than the White Paper’s 10% of their incomes on work transport.

Without knowing whether these commuters used the car because they had no alternative, or because they chose it over cheaper available modes, they cannot automatically be classified as less well-off.

#### 4.2 Measurement Problems

##### *4.2.1 Reliability of Household Income Data*

A First Measurement Problem is the Difficulty Associated with Collecting Reliable Household Estimates of Monthly Income in Surveys. it is Difficult Enough for Higher Income Survey Respondents to Add Member Monthly Salaries with Estimated Returns on Investments (E. G. Property Rentals, Interest Earned on Savings, Etc.) to Arrive at a Household Total. in the Case of Lower Income Survey Respondents, Typically Representing Households Characterised by Income Sources That are Variable, Sporadic and Diverse (E. G. in the Case of Incomes Derived from Informal Sector Economic Activities), it is Extremely Difficult to Obtain Accurate Monthly Household Income Estimates. These Difficulties, Together with a Commonly Encountered Reluctance of Many Households to Divulge Income Information in Surveys, Results in Non-Response or Non-Reporting Bias in Datasets. in Other Words, Particular Types of Households May be Unwilling or Unable to Provide Income Data in Surveys, Resulting in Their Under-Representation in Data Analysis and Expansion (See Richardson Et Al 1995 for Discussion on Non-Response Biases)

#### *4.2.2 Interpersonal Variability in Household Mobility and Resource Allocation*

A Second Measurement Problem is That a Household-Based Indicator of Transport Expenditure Fails to Recognise That Household Resources are Usually Allocated Unevenly Across Individual Members, Often on a Gender and Age Basis. Thus One Individual's Situation May be Different from Other Members of His or Her Household. Indeed it Can be Expected That Significant Differences Exist with Regard to Both Transport Expenditures and Affordability Expectations. For Example, Gender Power Relations Within the Household Help Determine Who Has Access to (Both Motorised and Non-Motorised) Vehicles, so That Efforts to Reduce the Transport Costs of (Often Male) 'Breadwinners' Will Not Necessarily 'Trickle Down' to Benefit Other (Often Female) Household Members (Turner and Fouracre 1995, Sohail Et Al 2003). Evidence Cited by the World Bank Suggests That Relying on Household Information Only Could Lead to Underestimating Inequality and Poverty by More Than 25% (Coudouel Et Al, 2002). Use of a Single Proportional Expenditure Benchmark at the Household Level Can Mask Important Differences in the Experience of Affordability Across Individuals

Simplifying data collection by basing the indicator on personal, as opposed to household, income and expenditure might therefore result in more accurate estimates, but conversely introduces new problems in so far as the indicator of transport expenditure is then unable to take into account that (while not necessarily evenly) household resources are shared across individual members. For example, even if an individual were unemployed, if his or her household included a high-earning member who made resources available across the household, the individual may be well-resourced relative to other unemployed persons.

#### *4.2.3 Reliability of Transport Expenditure Data*

A final measurement problem, similar to the first mentioned, relates to difficulties survey respondents experience in estimating their expenditure on transport. In this regard persons using private transport modes are likely to find it more difficult to estimate expenditure due to the often episodic nature of expenditure (e.g. replacing exhaust systems or tyres and repairing bodywork as and when required), and the diversity of expenses not easily recalled in the context of a survey interview or questionnaire (e.g. vehicle insurance premiums, licenses fees, automobile association membership fees, vehicle servicing, etc.). Greater inaccuracy of expenditure data associated with particular modes is likely to introduce further biases in data analysis.

### **5. CONCLUSION: TOWARDS MORE APPROPRIATE TRANSPORT EXPENDITURE INDICATORS**

Transport expenditure indicators are appropriate instruments for measuring the performance of the transport system over time, and can help give useful direction to decisions around subsidisation and pricing of services. However, the particular way in which these indicators have been defined and applied in South Africa has been misdirected and confusing. It is particularly the linking of the indicator to a benchmark of 10% of disposable income, specified by the White Paper on National Transport Policy (1996), that creates problems both conceptually and related to its accurate measurement. This paper argued that, in principle, problems of non-monotonicity prevent the accurate application of such a benchmark to situations spanning a range of modes and socio-economic conditions.

The problem appears to be less severe when based on just public transport passengers, but even then the use of a single 10% level as a benchmark appears rather blunt. There is evidence that "affordability" means different things to different people, depending on for

instance their income, location, and expectations. Applying a single benchmark across all households or all individuals within a household could be misleading, either masking important underlying trends, or leading to wrong-headed policy decisions. The implications of setting the “affordable” fare level of subsidised modes either too low or too high due to an inadequate understanding of user needs could be significant. There is clearly a need for a more robust understanding of transport affordability, perhaps based on both quantitative and qualitative explorations of how transport costs affect personal welfare and equity among individuals and households. Such work could help support the development of better-defined measures of affordability that could make a more relevant contribution to policy formulation. Problems with defining affordability in terms of *consumed* transport suggest that, perhaps, a measure based on the *potential* cost of access to some standard set of activities in relation to available (as opposed to consumed) transport services may be worth exploring.

Methodologically, current transport expenditure indicators need to pay much more attention to the consistent definition and accurate measurement of their components. Whether indicators are calculated based on the costs of using public transport only or all modes, for instance, can produce very different outcomes. Basing indicators on household/personal consumption may yield more reliable estimates than basing them on disposable income, as the latter is often extremely difficult to obtain accurately.

## 6. REFERENCES

- [1] Armstrong-Wright A., and S Thiriez, 1987. “Bus services: Reducing costs, raising standards”. Washington, D.C.: The World Bank.
- [2] Behrens R, 2004. “Understanding travel needs of the poor: towards improved travel analysis practices in South Africa”, *Transport Reviews*, Vol 24, No 3, pp317-36.
- [3] Coudouel A, J Hentschel & Q Wodon, “Poverty Measurement and Analysis”, in “A Sourcebook for Poverty Reduction Strategies”. The World Bank, 2002.
- [4] Department of Transport, “White Paper on National Transport Policy”. 1996.
- [5] Diaz Olvera L, Plat D and Pochet P, 2004. “Can Sub-Saharan Africa city dwellers afford transport expenditure: Empirical and methodological issues”, Unpublished paper, Laboratoire d’Economie des Transports, Lyon.
- [6] Republic of South Africa, 2000. National Land Transport Transition Act. Pretoria: Government Printer.
- [7] Richardson A, Ampt E and Meyburg A, 1995. “Survey methods for transport planning”, Eucalyptus Press, Victoria.
- [8] Sohail M, D Mitlin, DAC Maunder, “Partnerships to improve access and quality of public transport: Guidelines”. Loughborough University. 2003.
- [9] Statistics South Africa, “Earning and spending in South Africa: Selected findings and comparisons from the income and expenditure surveys of October 1995 and October 2000.” Pretoria, 2002.
- [10] TRC Africa, 2000. “Strategic customer-based passenger transport information project”, Transportation Research Consultants Africa, National Department of Transport, Pretoria.
- [11] Turner J & P Fouracre, “Women and transport in developing countries”. *Transport Reviews*, Volume 15, Number 1. January–March 1995.
- [12] Van der Reis A, Lombard M and Loubser R, 1993. “National passenger panel – 1992”, TRC Africa, Chief Directorate Roads, Department of Transport.