INCOME DATA COLLECTION METHODS AND DAILY TRAVEL ANALYSIS IN SUB-SAHARAN AFRICAN CITIES

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ABSTRACT

Knowledge of the burden of transport expenditure in the household budget of poor populations seems essential for passenger transport policy formulation in order to improve their travel conditions. In cities of the developing world, a high proportion of the population is poor and equity issues are therefore all the more important. However, the identification of the poor strongly depends on the indicators used and in these cities collection and analysis of income data encounters a number of methodological difficulties. The goal of this paper is to identify the type of data collection which provides the best estimate of individual incomes and how the analysis of travel and inequalities can be enhanced by improving the quality of income data. For this purpose, we have compared the survey methods in three household surveys conducted in Niamey and Douala. The results show that detailed collection of income data from each individual according to its source improves the accuracy of the total income assessment. They also show that inequalities with regard to consumption of transport services appear to be greater when income data is more accurate. The methodological findings of these analyses appear useful for academic work and transport policy appraisal concerning not only developing countries but also countries from the North.

Key-words: household survey, survey method, individual income, household income, equity, travel indicator, transport expenditure, concentration curve, measurement bias, Douala, Niamey.

INTRODUCTION

While it is important in any travel data collection process, the estimation of the income of households and individuals is particularly so in the cities of developing countries. In these cities, the vast majority of daily trips are by foot (Diaz Olvera et al., 2005) and in daily life there are many marked sociospatial inequalities as regards access to urban amenities (Diaz Olvera et al., 2007). However, investments in urban transport, which are usually focussed on the construction and maintenance of roads, benefit primarily the minority of citizens with private cars (Vasconcellos, 2001). In order to analyze equity as regards access to the city, the links between travel, poverty and development, and also in order to evaluate the redistributive aspects of transport policies, it is essential to start from an accurate estimate of the relative standards of living of individuals and households.
It is never straightforward to collect income data in household surveys, in particular because of refusals to respond and inaccurately estimated amounts (Scott, 2003; Pettersen, 2005). There are also difficulties that are specific to African cities:

- the increase in the number and variety of informal activities that has taken place since the 1980s, which has gone hand in hand with a reduction in the number of stable jobs. These informal jobs, which are dominated by microactivities involving trading and services, very often take the form of irregular and precarious casual jobs, which are paid irregularly in terms of time and amount. As no accounts are kept, it is difficult to estimate the net profit drawn from the activity;

- the wage-earning population is not protected from an interruption in its earnings. In the public sector, civil servants may not be paid for several successive months and the payments they eventually receive may not include all the arrears due;

- other sources of income (gifts, grants, allowances, pensions, rents), which vary a great deal from one household or individual to another, are far from being negligible, but the sums involved are also difficult to estimate;

- household size is often large and its structure is frequently dynamic, including extended family and non-family members for periods of time associated with access to employment, seasonal labour patterns, social obligations, or illness. It is therefore difficult to interview all the members of the household during the relatively short survey period, particularly those having income generating activities.

- the partial pooling of the income and expenditures of the various members of the household makes it necessary to perform a double analysis, at individual and household levels.

In order to overcome the difficulties of estimating the resources of households, and, because a household's standard of living is better measured by its consumption than its income, living conditions surveys involve the collection of expenditure data (Deaton and Grosh, 2000). However, in view of its complexity and cost, a survey protocol of this type is not feasible for

household travel surveys as these already spend a large amount of time collecting data about the previous day's activities and trips (Diaz Olvera et al., 2008).

This paper will primarily be concerned with the different ways in which individual income data can be collected, taking account of the fact that a large proportion of the economically active population works in the informal sector, that there are different types of sources of income and that an individual, whether economically active or not, can have several sources of income. The goal is to identify the type of data collection which provides the best estimate of individual incomes and how the analysis of travel and inequalities can be enhanced by improving the quality of income data. For this purpose, we have compared three survey methods (Box 1). The first is the household travel survey conducted in Niamey, the capital of Niger, in 1996. The other two are those used in the course of two household surveys conducted in Douala, the major economic centre of Cameroon, in the early years 2000, each with specific goals and methodologies: the living conditions survey (CAVIE) and the Poverty and Urban Travel Survey (PMU).

Box 1 – The Niamey and Douala household surveys

The 1996 Niamey travel survey took in 757 households and 2732 individuals of over 13 years of age. The information about the household, which was provided by the household head, related primarily to its dwelling, transport ownership and lifestyle. The individuals provided the information about themselves, in particular their socioeconomic characteristics (including income), their sociability networks, the availability of the household's vehicles, their opinions on the city and transport modes and their trips on the previous day. The following questions were asked about their professional activity and income: "Do you have a job?", "Is it a permanent/occasional job?", "Are you a salaried or non-salaried employee?", "What is your professional activity?", "Do you have another activity?", "If so, what?", "What are your approximate monthly earnings?".

The living conditions survey (Cavie, *Enquête sur le Cadre de Vie des Populations de Yaoundé et Douala*) was conducted in 2002 and took in 7,500 households. It collected data on various aspects of their living conditions, based on answers provided solely by the household head: infrastructure and basic services, services in the dwelling, durable goods, personal security and security of the dwelling, waste management and pollution. Household composition was also included in the survey, with information on all members of the household, including their income. Five questions dealt with the professional activities and incomes of the household members: "Have you engaged in an activity during the last 12 months?", "In what sector?", "What was the principal mode of remuneration?", "In what income bracket is your annual labour income?", "In what bracket is your annual income from other sources?".

The poverty and urban travel survey (PMU, *Pauvreté et Mobilité Urbaine*), conducted in 2003, aimed to analyze the links between poverty, daily travel and access to urban services. 600 households and 1885 individuals of over 10 years of age were surveyed (Sitrass, 2004). The following data was collected:

- at household level, household composition, housing quality, durable goods and access to basic services and infrastructure;
- for each individual of over 10 years of age, socioeconomic characteristics (including income), availability of vehicles, opinions on public transport, social integration, expenditure

on transport and trips made on the previous day. The questions about occupational activities and income were more detailed than in the CAVIE survey and are set out in Figures 1 to 3.

As in the Niamey survey, the information on the household was provided by the household head while the individuals answered questions about themselves.

Section 1 presents a brief survey of the jobs market in Douala and describes the data collection procedure for the PMU survey, which considered engagement in one or more professional activities and the different sources of income of all individuals of over 10 years of age. Section 2 compares the non-response rates in the different surveys for questions about income and the principal source of income. Based on the findings of the two Douala surveys, Section 3 uses simulations to show how the quality of income data for individuals and households can affect the measurement of inequalities in daily travel and transport expenditure. Finally, in the conclusion (Section 4) we shall discuss the benefits of detailed individualized income data collection both for analyses of travel and for measuring inequalities in transport use and expenditure.

1. THE METHOD FOR COLLECTING DATA ON PROFESSIONAL ACTIVITIES AND INCOME

1.1. How should data on the income derived from a professional activity be collected?

In African cities, as in other urban contexts in the South, professional activities can take many changing forms and it is frequently difficult to distinguish them from domestic or non-remunerated activities, in particular in the case of young people “in apprenticeships” and women. The Douala household expenditure survey (EDM, *Enquête sur les Dépenses des Ménages*), conducted in 2000, provided an overview of the jobs market and shows its complexity.

Half the citizens of working age have a job: 47% of individuals aged 15 years and over are economically active, with marked gender differences, the figure being 57% among men but only 37% among women. A small percentage of the working population combines principal activity with one or more secondary activities (6%). The EDM also highlights the situation in Douala as regards the formal and the informal sectors. Only a quarter of the workforce works in the formal sector: 8% in the public sector, 18% in the private sector. The variety of the forms of activities in the informal sector greatly exceeds that of the formal sector, representing 69% of the available jobs, and even 79% of the jobs for women. Also, only a minority of employed persons are paid on a monthly basis (38%), fewer than those who are paid on the basis of the profits (42%), 5% being paid daily, 4% by the piece and 7% not being paid at all. Furthermore, work in the informal sector is somewhat irregular. While the working weeks are generally fairly full (on average 5.6 days), some jobs seem particularly precarious in terms of duration. Apprentices, family helpers and unskilled workers, as well as individuals who are paid by the day or not paid at all, work on average only 9 months a year.

The irregular nature of economic activities, which has also been observed in other household travel surveys in Sub-Saharan cities, led us to include several questions in the PMU survey protocol in order to identify whether an individual of more than 10 years of age was engaged in a professional activity and if so, what its rhythms were:

- in order to identify the nature of the principal activity, its regularity (over the last 12 months and the last 30 days) and how long the individual has been doing it (Figure 1). This information is also used to reconstruct annual incomes;

- to identify engagement in remunerated secondary activities (Figure 2).

Have you been gainfully employed (in cash or in kind) in the past 30 days?
Is this a permanent job?
Are you a salaried employee?
Description of principal activity
For how long have you been engaged in this activity? *(number of years)*
How many months did you work out of the past 12 months?
How many days did you work out of the past 30 days?

Figure 1 – Identification of principal activity in the PMU survey

Do you have other activities that generate income in cash or in kind?
How many?
What are these activities?

Figure 2 – Identification of secondary professional activities in the PMU survey

1.2. How is it possible to collect data on individuals' different sources of income?

The goal is to identify as thoroughly as possible all the different sources of individuals' income. As mentioned above, we preferred to question each individual as the household head is not necessarily aware of the financial position of each household member. When data was collected, different possible sources were mentioned and respondents were left free to estimate their earnings from each source according to the most appropriate periodicity (Figure 3). There are two advantages to this more detailed data collection:

- As an individual can have several sources of income, listing seven sources of income helps reduce omissions;

- Depending on the periodicity reported by the respondent, each type of income can be extrapolated on a monthly or annual basis in order to estimate a total sum.

No.	Type of monetary resources *(CFA francs)*	Do you receive... 1. Yes 2. No	Periodicity 1. Daily 2. Weekly 3. Monthly 4. Quarterly 5. Half-yearly 6. Annually 7. Other.....	Amount
51.	Wages / salary / profit from principal activity			
52.	Wages / salary / profit from secondary activity (activities)			
53.	Wages / salary / profit from other professional activities			
54.	*Total professional income (51+52+53)*			
55.	Annuities			
56.	Grants, gifts, alimony, allowances, etc. (from persons outside household)			
57.	Family allowances, pensions, scholarships			
58.	Other			
59.	*Total other income (55+56+57+58)*			
60.	Total individual income (54+59)			

Figure 3 – The collection of income data on individuals of over 10 years of age in the PMU survey

The survey protocol makes it very clear that the income data should relate to money earned outside the household in order to avoid double counting. In particular this prevents the counting of monetary transfers between members of the household (pocket money, paying for meals taken outside the household). Last, particular attention is paid to the collection of income data during the training of interviewers in order to make them aware about variable periodicities, the essential difference between turnover and profit and the need to limit the risk of double counting in the case where several members of the household take part in the same economic activity.

2. METHODOLOGICAL LESSONS

2.1. The non-response rates for income are linked with the mode of data collection

Comparing the three surveys (the Niamey travel survey, the PMU and CAVIE surveys in Douala) provides a number of methodological lessons about the effectiveness of each income data collection mode (Table 1).

The very marginal non-response rate obtained in the CAVIE survey (1% compared with 9% in the PMU survey and 15% for Niamey) is due to the fact that the data collection process was simplified in two ways, by using a single informant and income classes. However, this reduced precision as regards the nature and amount of each household member's income. Some income was not reported simply because the household head was not aware of it.

Table 1 – Non-response rates for income in the three surveys (% of all individuals)

	Niamey travel survey	Douala PMU	Douala CAVIE
10-15 years old*	2.5	19.6	0.0
16-45 years old, economically active	29.2	5.4	2.6
16-45 years old, not economically active, household head	16.7	18.5	3.6
16-45 years old, not economically active, other position in household	2.7	12.8	0.2
46-55 years old, economically active	30.5	3.5	2.9
46-55 years old, not economically active, household head	12.9	14.3	3.0
46-55 years old, not economically active, other position in household	0.0	4.5	0.7
56 years old et plus, economically active	38.4	2.1	4.8
56 years old and over, not economically active, household head	19.3	4.1	1.8
56 years old and over, not economically active, other position in household	0.0	4.3	0.3
Total	*14.8*	*9.3*	*1.1*

* 14-15 years old in the Niamey survey; 11-15 years old in the Douala PMU survey.

In contrast, comparing the Douala-PMU and Niamey surveys, when individual data collection was used, the more complex questionnaire considerably reduced the non-response rate. More precisely, the gain was very marked among those with work, and less so, or even negative, for those not in employment, depending on their category. However, in contrast with the CAVIE survey, the non-response rate for the PMU survey was very probably overestimated as some non-responses seem to take the place of non-existent or extremely low incomes. This is shown by the high non-response rate among the under 15 year olds (20%). The same applied amongst those in employment, for whom the non-response rate was nevertheless much lower (4% for all ages combined). More than two-thirds of the non-respondents worked in the informal sector or agriculture, or as apprentices or family helpers which is not always paid work.

Non-response rate therefore only provides partial information about the quality of the collected data. Simplified and centralized collection of data from a single informant (as in the CAVIE survey) can provide an artificially low non-response rate as the informer may report zero income rather than try to make an evaluation or say that he/she does not know as a result of the difficulty of estimating the income of the various household members. In contrast, more sophisticated and individualized data collection (as in the PMU survey) can result in a non-response rate that seems greater for individuals without any income. Non-response in the case of these individuals may simply be due to the fact that the interviewer forgot to take note of all the zero income items. We shall return to this double phenomenon when we consider the principal sources of income of different groups of individuals in the two Douala surveys.

2.2. Collecting data from individuals greatly improves reporting of income from labour and gifts from outside the household

The great advantage of a survey that disaggregates the different sources of individual income on the basis of its source is to limit omissions on the part of respondents.
In the PMU survey, half of the respondents, who were over 10 years of age, reported having a remunerated professional activity, and this percentage was still high (57%) if only those aged 16 and over were considered. These figures are higher than in the CAVIE survey (respectively 44% and 51%), but do not reflect an improvement in general economic activity. The explanation is more to be found in the fact that the collection of disaggregated data initially provides more reliable results about labour and later makes it easier to remember and report related earnings.
Likewise, in the PMU survey, 34% of respondents reported having income from sources other than work (gifts, grants, allowances, pensions, rents), with some individuals combining several such non-occupational sources (Table 2). Even if the sums involved are frequently quite small, a failure to give information about them would reduce the personal resources of a major proportion of the population, in particular those who are economically inactive, 44% of whom reported income from non-occupational sources. This ignorance about the real income of the economically inactive is clearly apparent in the CAVIE survey where only 8% of the economically inactive individuals of more than 10 years of age were reported by the household head as receiving non-occupational income from outside the household.
By comparing the CAVIE and PMU surveys we can examine in detail the effects of explicitly collecting data about non-occupational income. In the case of economically active individuals, the greater precision that results from this explicit data collection elicits caution about the role played by labour income. In value terms, resources from work account for 95% of the income of the economically active individuals of over 10 years of age in the CAVIE survey, but less than 90% in the PMU survey. This difference is explained by better collection of data about activities, as has already been seen, but also by the existence of other sources of income (Table 3) that exceed income from work for 13% of the economically active individuals in the PMU survey compared with only 0.3% in the CAVIE survey.

Table 2 – The percentage of individuals reporting different sources of income in the Douala PMU survey

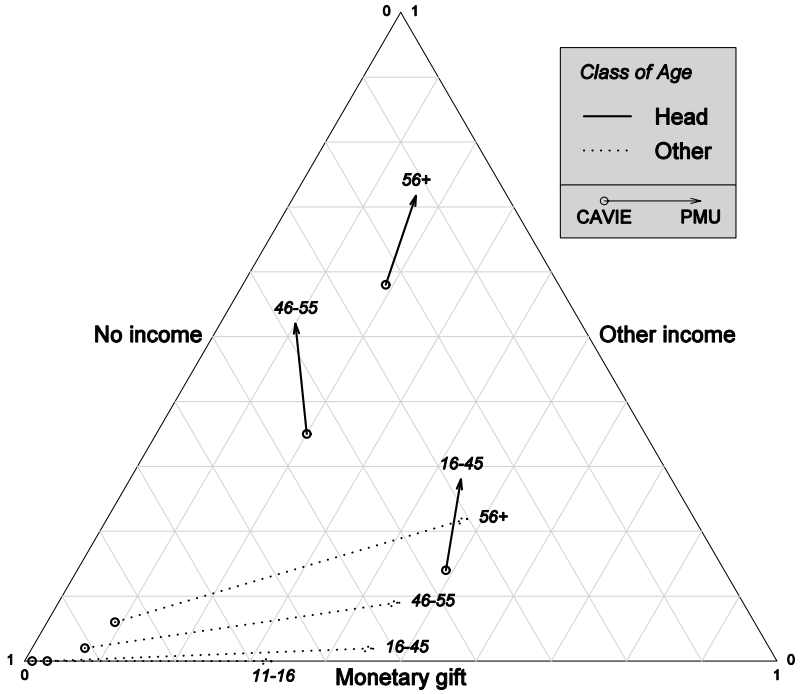
	% of individuals of over 10 years of age reporting…*	% of income
… income from a professional activity (principal)	50.3	79.7
… income from a professional activity (secondary)	4.6	4.2
… income from rents	4.8	4.3
… income from gifts	27.7	8.7
… income from allowances or pensions	3.1	3.1
… other income	0.6	0.0
… no income	*23.7*	
Total		*100.0*

* The total is greater than 100 % as an individual can have several sources of income.

Table 3 – The distribution of economically active individuals according to their principal source of income in the Douala CAVIE and PMU surveys

	CAVIE	PMU
… income from professional activities	98.5	82.1
… income from gifts	0.2	7.3
… income from allowances and pensions	0.1	5.8
… no income	1.2	4.8
Total	*100.0*	*100.0*

The differences between the surveys are even more marked for the different groups of economically inactive individuals. Figure 4 breaks down each group of inactive individuals into three categories: those who have no income, those whose main income is from gifts, and those whose main income is from other sources (rents, annuities, pensions, etc.).



Key: The initial point of each segment gives the value reported in the CAVIE survey, and the terminal point shows the value reported in the PMU survey. The segment highlights how much more information about principal sources of income is provided in PMU compared with CAVIE for different groups of economically inactive individuals. For example, in the case of household heads aged 56 years and above, according to CAVIE 23% have no income, 19% have gifts as their principal source of income and 58% derive their income principally from other sources. According to the PMU survey, these percentages are respectively 12%, 16% and 72%.

Figure 4 – Distribution of economically inactive individuals on the basis of their principal source of non-occupational income, as reported in the Douala CAVIE and PMU surveys

Generally, irrespective of which group the inactive individuals belong to, if the questionnaire reminds respondents about potential sources of income (PMU survey) the number of individuals without income is significantly lower. However, the effect is still more marked in the case of individuals who are neither active nor household heads. According to the CAVIE survey, more than 90% of this group (and even almost 100% for the youngest members) have no income. The PMU survey gives a considerably lower percentage, in particular because of gifts. Furthermore, it is noteworthy that in the PMU survey the percentage of individuals who are not household heads and who have no income falls even more markedly with age. For example, while in the case of the youngest group the difference between the

two surveys is about 30 percentage points, for the oldest group it is about 50 percentage points! The situation is that the older individuals are, the more they are able to mobilize and capitalize the "investments" they have made during their life, whether in terms of rents, social networks (gifts; Marie, 1997) or a previous salaried activity (pensions). The differences between the two surveys are less in the case of household heads who are economically inactive as they are more likely to report their income as a result of their position as household head. The percentage of individuals without incomes nevertheless falls by about 10 percentage points, irrespective of age group, and this reduction results from better reporting of sources of income other than gifts (rents, pensions, etc.). These findings show that the detailed identification of income from sources other than work considerably improves the measurement of individual incomes, to varying extents for different groups.

3. SENSITIVITY OF TRAVEL INEQUALITIES TO THE ESTIMATION OF INCOME

Is the increased precision obtained by improving income data collection procedures indispensable in order to measure transport inequalities and to evaluate the redistributive or regressive nature of transport policies? Or, put another way, is the underestimation of income that results from a less disaggregated grid and which only collects responses from one person in the household acceptable in the context of analyses of this type? One way of answering these questions is to simulate what the results from the PMU survey would have been with the redistribution of incomes from the CAVIE survey, then to compare the distributions of travel and transport expenditure indicators obtained with the simulated and observed incomes.

3.1. Simulation method

The simulation method can be summarized as follows. The distribution of individuals on the basis of their principal source of income as reported in the CAVIE survey, which identified more individuals without incomes, was applied to the sample from the PMU survey, which meant that some randomly selected respondents had their incomes reset to zero. As has been shown in the previous section, the CAVIE survey's underestimation of incomes depends on the principal source of income. To take account of this, we have applied variable underestimation rates to the incomes from the PMU survey (Table 4): 10% when the principal source of income was a professional activity; more than 50% when the principal source of income consisted of allowances, rents or other sources; almost 90% when gifts were the principal source of income.
Three hundred income distributions were simulated successively in this way. The simulation results were then compared with the observed results using concentration curves and concentration indices for the different travel and transport expenditure indicators for various simulated income distributions (Figures 5 to 12 and Table 5). The concentration curves provide a graphic representation of the proportionality of the distribution of an indicator (number of daily trips, travel time budget, transport expenditure) in relation to the population (individuals or households), which is put in order of increasing income. In the case of

indicators that have been estimated at household level, the income that is considered is calculated by summing the incomes of each household member. The simulations do not involve the travel behaviours of individuals but only the way these individuals are classified relative to one another according to their income. The individuals whose income has been randomly set at zero are therefore classed amongst the first. Approximately a quarter of the individuals are moved in this way during each simulation.

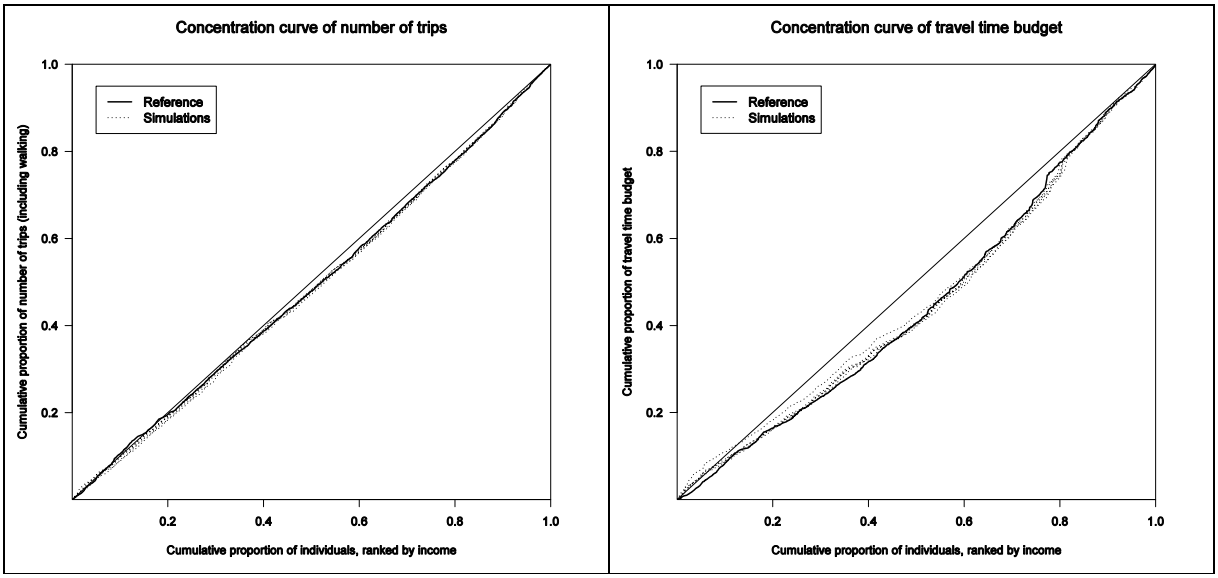
Table 4 – Distribution of individuals according to their principal source of income and the probabilities used to simulate income distributions for the PMU survey sample

Principal source of income	PMU survey (%)	CAVIE survey (%)	Probability of incomes being set at 0 in the PMU income simulations
Professional activities	49.1	43.8	0.1082
Allowances, rent or other	4.5	2.0	0.5608
Gifts	21.0	2.7	0.8713
No income	25.4	51.5	
Total	*100.0*	*100.0*	

To facilitate the interpretation of the graphs, only six plots have been shown: those obtained directly from the PMU survey, and, arbitrarily, the result of the first five simulations. The further the plot is below the line of equal distribution, the more unequally the indicator is distributed among the population and the higher its concentration index. Mathematically, the latter is equal to 1 minus twice the surface area between the plot and the abscissa.

3.2. Travel indicators

The travel indicators that are the most equally distributed according to the income of individuals, namely the number of trips and the daily travel time budget for all modes combined, are also those for which the impact of a precise measure of income is the most limited. Citizens with non-existent or low incomes compensate for their lower access to motorized modes by intensive walking, which explains why the concentration plot for the number of trips and the travel time budget for all modes is almost flat (Figures 5 and 6) and why the values of the corresponding concentration indices are close to zero (Table 5).

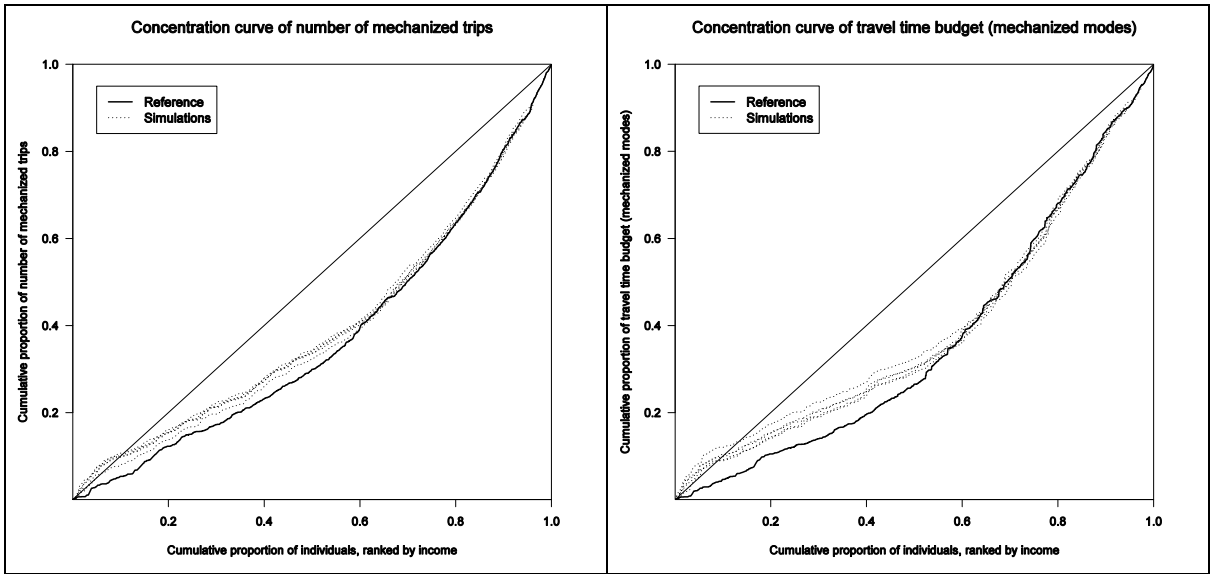


Figures 5 and 6 – Concentration curves for total travel and travel time budget according to the observed distribution and the simulated distributions of individual income

Table 5 - Concentration indices

Travel indicator	Income observed in the PMU survey (reference)	Simulated income (n = 300)	
		Mean	Standard deviation
Number of trips by all modes combined	0.024	0.028	0.007
Travel time budget for all modes	0.101	0.093	0.014
Number of mechanized trips	0.262	0.211	0.019
Travel time budget for mechanized modes	0.273	0.218	0.021
Individual public transport expenditure	0.277	0.208	0.019
Individual expenditure on all modes (including private vehicles)	0.430	0.331	0.035
Household expenditure on public transport	0.217	0.184	0.013
Household expenditure on all modes (including private vehicles)	0.356	0.311	0.024

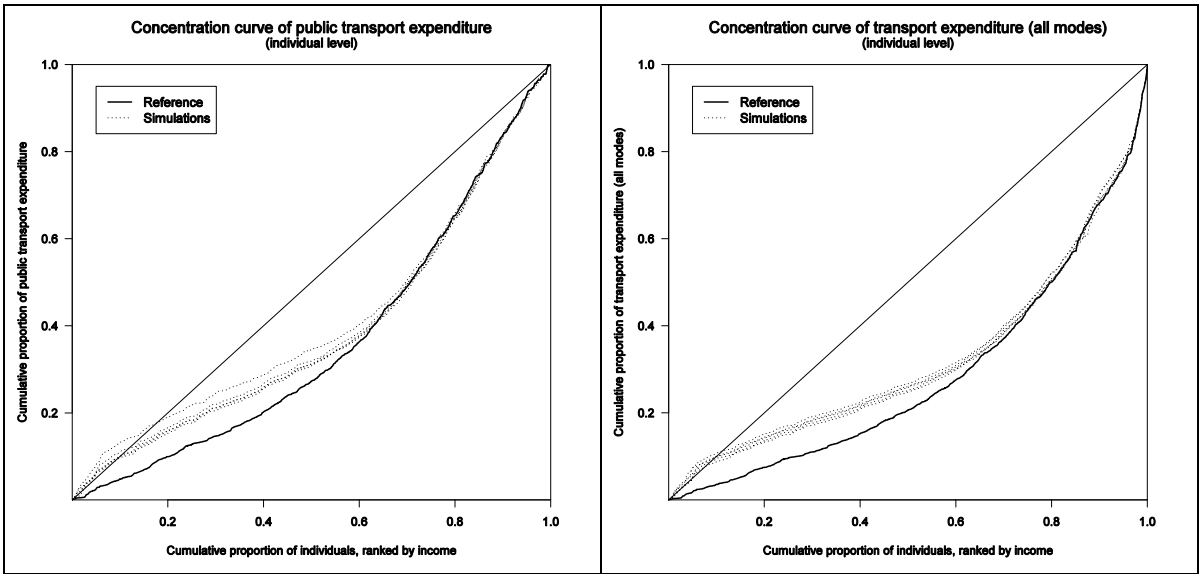
The benefits of collecting precise income data increase when the travel indicators are limited to mechanized modes, essentially motorized modes in the case of Douala. As can be seen in Figures 7 and 8, the plots for the simulated income distributions are above the plot for the observed distribution. For the two travel indicators, the largest differences with the observed plot seem concentrated in the first half of the distribution. At the outset, we can state that this means that collecting aggregated data reduces inequalities with regard to mechanized travel – the simulated concentration indices are about 80% of those obtained for the observed data. Above all, however, it is important to note that this underestimate does not affect the entire population in the same way and is essentially due to an inaccurate evaluation of the situation of the poor.



Figures 7 and 8 - Concentration curves for mechanized mode travel and travel time budget according to the observed distribution and the simulated distributions of individual income

3.3. Transport expenditures

The benefit of an accurate estimation of incomes is even clearer when we consider the concentration of individuals' expenditure on urban trips, taking account of expenditure of all types whether public transport on its own or public transport and private vehicles together (Figures 9 and 10).

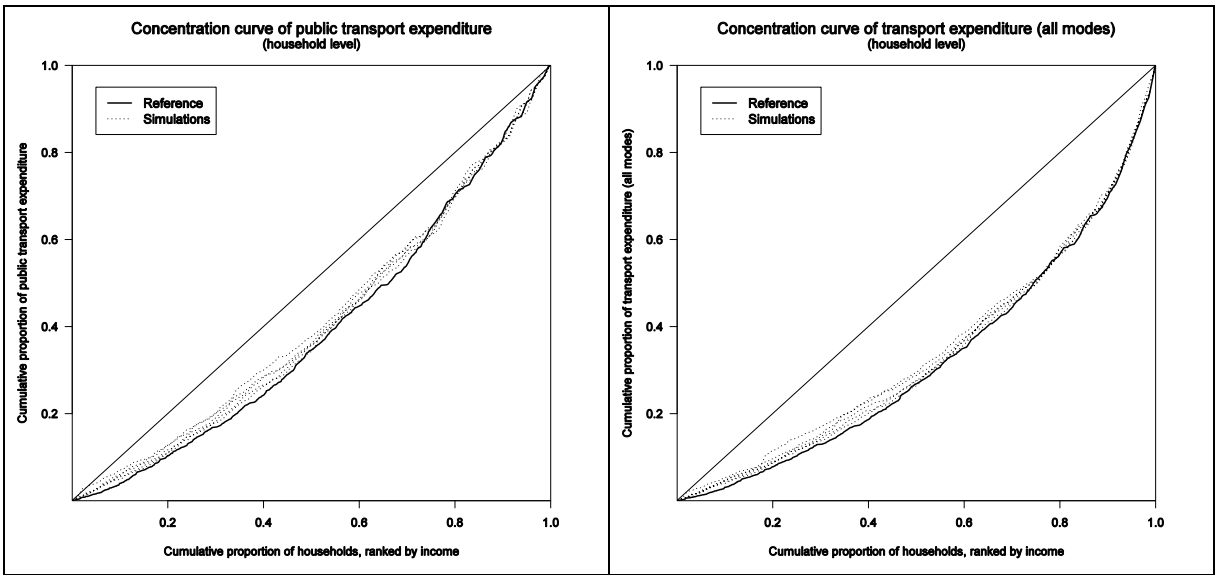


Figures 9 and 10 – Concentration curves for public transport expenditure and total travel expenditure according to the observed distribution and the simulated distribution of individual income

Once again, almost all the simulated plots are above the observed plot throughout the distribution. The differences are particularly marked for the first three quintiles, resulting once again from an inaccurate evaluation of the situation of the poor: individuals with no resources are mixed with individuals with resources which although often limited allow them some access to public transport. The result is a very marked underestimate of the associated

inequalities as in this case the concentration indices for the simulated values only attain three-quarters of those for the source data.

Household level analysis considerably reduces the general level of inequality and the variability between observed and simulated data (Figures 11 and 12): the average values of the indices for the simulations were more than 85% of the observed indices. This is caused by aggregating individuals in the same unit (the household) with heterogeneous characteristics, for example economically active husbands with large incomes with wives or young economically inactive persons with relatively low incomes. The simulated concentration indices nevertheless remain lower than the reference indices (by approximately 10 to 15%), but the errors due to incomplete collection of income data are slightly displaced compared with the evaluations made for individual data: the first quintile is now slightly better observed than the next two quintiles.



Figures 11 and 12 – Concentration curves for public transport expenditure and total travel expenditure according to the observed distribution and the simulated distributions of household income

Incomplete collection of individual resource data therefore leads to an incorrect perception of the situation of the poorest individuals by generating classification errors due to the fact that those citizens without any monetary resources are placed in the same category as individuals who are slightly better off. The effects are less marked at household level, with erroneous classifications affecting households who are slightly higher in the income hierarchy, with the danger that our perception of the travel characteristics of households that are nearest the poverty line will be blurred.

3.4. The share of household budget spent on transport

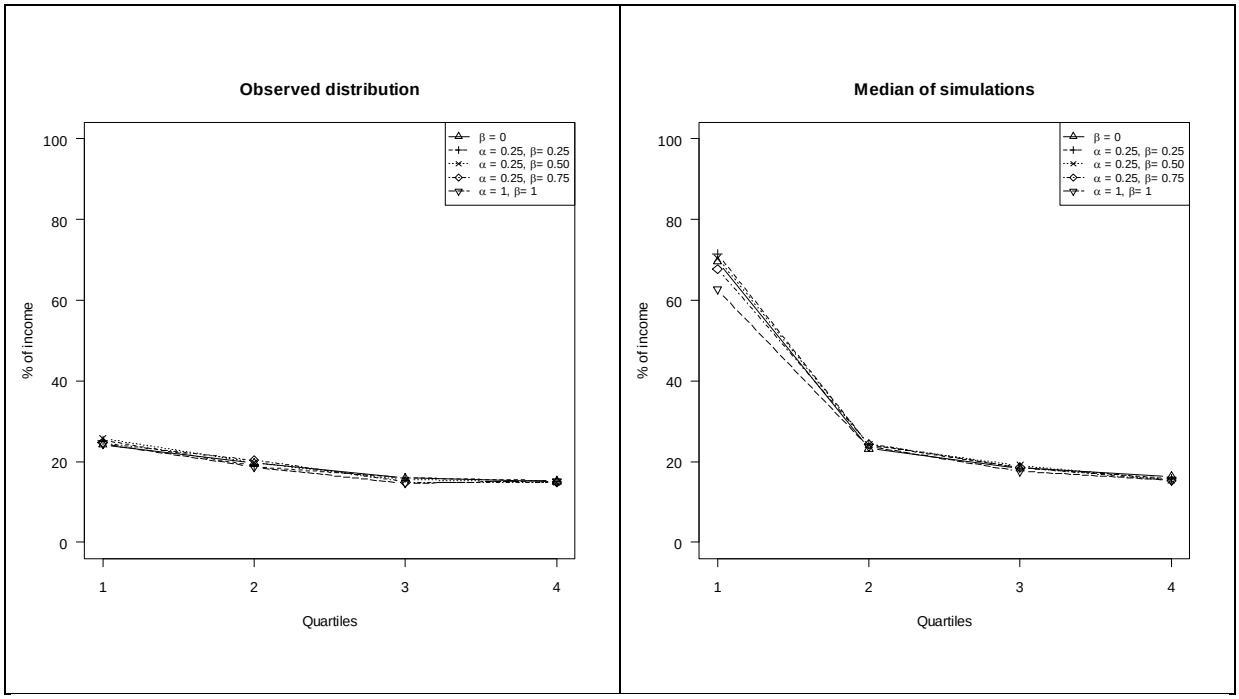
Households spend on average 17% of their budget on daily travel, but this proportion varies according to their standard of living (Diaz Olvera et al., 2008). Before considering how the quality of income data collection affects the estimated value of this share, it will be helpful to

look more closely at the difficulties involved in estimating the standard of living of households.

It is quite obvious that a given income will not provide the same standard of living for a single person living alone and a family with 5 children. In order to make the conversion from income (or expenditure) to standard of living, economists use an equivalence scale that expresses the differing needs of different individuals (adults and children in particular) and the economies of scale that result from household size (a couple does not necessarily need twice the amount of space in their home as a single person). The number of individuals in the household is thus expressed as a number of consumption units. Households are then divided into quintiles, not according to their total income but according to the ratio between their total income and their number of consumption units.

Determining an equivalence scale is however a complex problem that has raised much controversy (Lechêne, 1993), and in the absence of a consensus in this area it may be advisable to test the sensitivity of results to the scale that is used by considering a variety of formulations. For this study we selected five different scales based on the usual formulation $(A+\alpha K)^{\beta}$, in which A is the number of adults, in this case individuals aged 18 and over; K the number of young people, weighted by a coefficient expressing the relative cost of a child (α),and β the parameter providing a means of taking account of economies of scale. As a result of the limited use of mechanized modes among the young, in addition to the two extreme formulations ($\beta = 0$, i.e. a classification based on total income, and $\alpha = 1, \beta = 1$, the per capita classification), a low relative cost parameter for children ($\alpha = 0.25$) and three different values for β (0.25; 0.50; 0.75) will be taken into consideration.

As can been seen in Figure 13, whatever equivalence scale is used, transport accounts for a lower share of expenditure as households become more well-to-do. Daily travel thus absorbs almost a quarter of the resources of the poorest households, a fifth of those in the second quartile and about a seventh of those in the most well-to-do half of the population (quartiles 3 and 4). The simulated distributions also show a tendency for the budgetary coefficient to fall as household resources increase, and this occurs independently of which equivalence scale is used (Figure 14). But the estimated coefficients are in this case systematically greater than those that have been observed, the bias once again varying greatly according to the wealth of the household. The difference, which is fairly moderate for the wealthiest households, is extremely large for the first two quartiles: the overestimate reaches the level of roughly a quarter for the second quartile, while the estimated coefficients for the poorest households are quite implausible. Once again, incomplete or inaccurate income data collection leads to an erroneous interpretation of the studied phenomenon, in this case the budgetary coefficient of transport, in particular for the poorest households.



Figures 13 and 14 – Budgetary coefficients by quartile for five equivalence scales according to the observed and simulated distributions of income

4. CONCLUSION

Two important methodological lessons can be drawn from this comparison between the alternative ways of collecting income data in household surveys in African cities. The first way the collection of income data can be improved is by interviewing each member of the household personally. Individualized data collection is compatible both with the data collection procedures for travel surveys which lay a great deal of importance on information about individuals and with the analytical options which require the status of individuals within the household must be well known. The second improvement relates to the detailing of different sources of income, allowing respondents to select the time base for evaluating each of their income items. Our comparisons between different surveys show that this alternative both reduces non-response rates and improves “remembering” of the various inflows that make up the individual’s budget. This means that more income from professional activities is reported, and, even more clearly, reveals the importance among the economically inactive of certain types of income, for example gifts in the case of Douala. The two options, individual data collection and detailed income data collection, are both expensive in terms of interviewer time and therefore total survey time and survey cost. However, precise knowledge about the income of all individuals seems essential, initially in order to determine their financial capacities, then in order to reconstruct the entire income of the household and, lastly, to classify correctly all individuals and households within the distribution of incomes.
The reason for this is that we have observed that the way individuals and households are classified on the basis of income data is affected, which in turn impacts on the measurement of inequalities between individuals and between households as regards consumption and transport expenditure. The omission of some income during data collection, and in particular the omission of certain types of income more than others, tends to reduce the concentration

of motorized mode use and related expenditure with respect to income. Consequently, inequalities in the consumption of transport services are underestimated, which biases assessment of the redistributive effects of public transport policies.

Of course, there are a number of pitfalls which must be avoided in the detailed collection of individual income data. As early in the process as the training of survey staff, interviewers and supervisors must be made aware of the dangers of failing to distinguish between the profits and turnover of commercial activities, the risks of double counting (in particular because several individuals are active in the same firm or family activity) or of confusing monetary transfers between individuals in the same household with monetary gifts from outside. Obviously, this method of income data collection cannot prevent some individuals, for a variety of reasons, from refusing to respond or deliberately providing false information, particularly underestimates. However, in all cases, specifying income on the basis of a detailed typology reduces the risks of omissions or errors.

In the cities of the South, and more particularly in the cities of Sub-Saharan Africa, the institutional context does not foster an accurate perception of the transport problems experienced by disadvantaged groups. The investigation of travel issues is frequently concerned with engineering issues and data collection is very much focussed on the travel of economically active groups (Behrens et al., 2006). Moreover, the income data is partial because in major statistical surveys, such as consumption surveys, data is collected for the entire household and centred on income from labour. Shortcomings in the statistical apparatus thus make it more difficult to investigate the links between daily travel, poverty and social exclusion and, ultimately, blur our perception of transport demand issues. Accurately estimating travel practices in their diversity, on the one hand, and correctly identifying the complexity of individual determinants, including income, are a prerequisite for taking better account of issues of equity with regard to transport policy and access to the city in public policies, which are essential issues when poverty is omnipresent.

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