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Assessment of mobility inequalities and income data collection. Methodological issues and a case study (Douala, Cameroon)

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ABSTRACT

In order to understand the scale and nature of inequalities in intra-urban mobility we need reliable income data, but this is generally difficult to collect in household surveys. The methodological approaches that are employed to overcome difficulties in income data collection may affect the relative position of individuals and households within the income distribution and our estimates of mobility inequalities. In the context of a case study of Douala, this paper evaluates how the way income data is collected affects its accuracy and therefore the measurement of daily mobility inequalities. Simplified data collection tends to minimise the scale of inequalities as it misrepresents the income distribution. The error is greater in remote zones. Shortcomings in the statistical apparatus with regard to income data thus blur our perception of mobility inequalities and impede investigation of the links between daily travel, poverty and social exclusion.

1. Introduction

In metropolitan areas that are experiencing marked spatial growth, as is the case in sub-Saharan Africa, access to the activities and resources afforded by the city is far from universal. This is primarily because of socio-geographical disparities in the distribution of urban services and jobs (Myers, 2005; Rakodi, 2005). However, the situation is further worsened by major inequalities in the use of motorised transport modes, not only cars but also public transport which is too expensive for poor city-dwellers to use on a regular basis (Bryceson et al., 2003; Diaz Olvera et al., 2013; Lucas, 2011; Salon and Gulyani, 2010; Sietchiping et al., 2012). Differences between individuals' travel behaviours obviously exist, in the same way that there are differences between their state of health and access to healthcare and, in the case of the young, their possibility of going to school. When such differences between individuals result in disadvantages with regard to daily mobility, they are perceived as inequalities if they are due to situations that are partially or completely unchosen (income, gender, age, physical capacities, accessibility of residential location, etc.). In sub-Saharan Africa, transport policies take little account of the issues of social and geographical equity, i.e. the goal of fostering a more equal access to mobility, and, more broadly, to urban resources.

Investments in urban transport are usually focused on the construction and maintenance of roads and benefit primarily the minority of citizens with private cars (Vasconcellos, 2001). The Bus Rapid Transit systems which have recently been built, or which are currently planned, in many large African cities (Addis Abeba, Dakar, Dar es Salaam, Lagos, etc.) could indicate a change of policy direction, but it is still too early to assess if they will be affordable and located where they can serve low income populations. Both these conditions must be satisfied if the mobility of the poor is to improve. Teunissen et al. (2015) have shown, for example, in the case of Bogotá, that while the Transmilenio serves the zones with the greatest concentrations of poor people, its cost means they are unable to make much use of it. Such decisions on the part of the public authorities are explained by a variety of factors such as the role of international organisations and donors or the desire to have "modern" transport systems which use up-to-date technology. But even if the public authorities wished to consider the impacts of transport policy with regard to equity, they would in most cases be unable to do so because of an absence of adequate statistical data. The knowledge of the scale and nature of intra-urban inequalities requires reliable statistics disaggregated by income group (Mitlin et al., 1996). Such income statistics must then be compared with travel behaviours. But as the investigation of travel issues is frequently concerned with engineering considerations, data collection is still very much focused on the travel of economically active groups (Behrens et al., 2006).

It is never straightforward to collect income data in household surveys, in particular because of refusals to respond and the fact

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that the amounts involved are, deliberately or not, inaccurately reported. Researchers have investigated this issue in countries of the North (see, in particular Davern et al., 2005; Hansen and Kneale, 2013; Micklewright and Schnepf, 2010; Moore et al., 2000; Scott, 2003). In the case of travel surveys in countries like the United States or Australia, Stopher (2012) recommends asking respondents to indicate a relatively wide income band rather than state the exact amount in order to reduce nonresponse rates. The issue of collecting income data in surveys has, however, been considerably less studied in developing countries, even though the estimation of income poses particularly great problems there (Pettersen, 2005; Deaton, 1997; Deaton and Grosh, 2000). In theory, a more satisfactory approach would be to evaluate the standard of living on the basis of household expenditure (Deaton and Grosh, 2000), but the complexity and cost of a protocol of this type means that it cannot be implemented in a household travel survey (Diaz Olvera et al., 2008). The direct collection of individuals' incomes in these surveys is therefore indispensable. However, it raises three sets of difficulties, particularly in Africa.

First, several factors make it difficult to estimate the income derived from work. In this context where the amount of paid employment is falling and the number of informal microactivities is on the rise, many workers depend on precarious jobs and occasional work, for which they are paid irregular amounts at irregular times (De Vreyer and Roubaud, 2013). For the numerous self-employees, like petty traders or low-skilled craftpersons, it is difficult to estimate the net profit drawn from their activity as no accounts are kept. Similarly, in the case of young women, for example in apprenticeships, it is not at all easy to distinguish labour from domestic or non-remunerated activities. In addition, it is common for individuals to have a number of activities, and this applies not only to individuals in paid employment who do so in order to diversify their sources of income and to save, but also to individuals working in the informal sector, who do so in an attempt to compensate for the irregular nature of their principal activities (Bocquier et al., 2010; Ersado, 2006; Iyenda, 2005).

Second, income cannot be restricted to the sums that are earned from professional activities. It also includes grants and benefits, rents, pensions and, above all, gifts from one individual to another. Particularly in the case of the latter, it is difficult to estimate the sums involved because of the irregular nature of the transfers. But even if chains of solidarity are tending to weaken (Abdullah, 2000; Leimdorfer and Marie, 2003; Séraphin, 2000), gifts from outside the household continue to contribute significantly to the total income of individuals and households, particularly among the poor (Lourenço-Lindell, 2002).

Last, the economic behaviour of the population and the role of the household also add to the difficulty of estimating standards of living on the basis of income. Individuals are often unaware of the personal resources of the other members of their household, and not all income is pooled (Glick and Sahn, 2000; Hoddinott and Haddad, 1995; Posel, 2001; Yapi-Diahou, 2000). Among other things, the implication of this for transport is that access to motorised modes is more strongly conditioned by an individual's personal monetary resources than by those of his or her household (Diaz Olvera et al., 2008; Venter et al., 2007).

The aim of this paper is thus to evaluate in what way income data collection affects the accuracy of data and therefore the measurement of mobility inequalities. We have done this by referring to a household travel survey conducted in Douala (Cameroon) in 2003 in which respondents' income data was collected in a disaggregate and precise manner. The estimated values of mobility inequalities obtained from this survey have been compared with what was observed from less sophisticated data collection. This data was not the outcome of specific fieldwork conducted at the same time as the travel survey but was obtained from ex post simulations which provide less accurate income data, that are comparable with those obtained from surveys that collect income data in a much simpler way. The case study provides a variety of information about mobility inequalities in Douala. However, our aim is not to analyse their determinants or to identify policies that might reduce them, but rather to evaluate how their measurement is affected by a number of methodological decisions.

After a short description of the local context of Douala, Section 2 describes the income data collection procedure used for the travel survey and presents the simulation method. Section 3 uses the results of the simulations to show how the quality of income data affects the measurement of inequalities in daily travel and transport expenditure for individuals and households. Section 4 concludes on the benefits of detailed individualised income data collection for the measurement of inequalities in daily mobility and in transport expenditure.

2. Data and method

The PMU survey ("*Pauvreté et Mobilité Urbaine*", Poverty and Urban Mobility) carried out in 2003 aimed to analyse the links between poverty, daily mobility and access to urban services in Douala.[1] Urban areas were stratified according to the availability of urban services, how long ago they became urbanised, distance from the centre and major roads, and the standard of living of the residents. Thirty survey zones were then selected within the stratified areas and the sample of households was selected randomly within the survey zones. 600 households and 1885 individuals of over 10 years of age were surveyed by face-to-face interviews in their home (Sitrass, 2004).

2.1. The study zone

Douala is Cameroon's most populous city, with nearly 2 million inhabitants in 2003. It is also a port and the main gateway for imports and exports. Douala is the country's economic capital and provides the location for more than half the country's economic activity and industrial production. Economic activity is nevertheless dominated by the informal sector which employed 62% of the workforce in 2005. As a result of the low level of wages, 14% of the population have at least two professional activities (De Vreyer and Roubaud, 2013).

The city has developed in a site that is subject to severe geographical constraints. Some informal districts have sprung up in swampy zones or on natural drainage courses or slopes. The Wouri River which crosses the city also poses a major constraint for transport, since the only bridge between the two banks creates a notorious bottleneck (Fig. 1).

As in other cities of sub-Saharan Africa, in Douala walking is still the population's principal means of transport. Access to private vehicles is very limited and motorised trips are mainly made on public transport (Diaz Olvera et al., 2013) which is provided by six modes: shared taxi, motorbike taxi, minibus, bus, light truck, undeclared cab. Most public transport trips are made by shared taxis, but the modal share of motorbike taxis is rapidly increasing, as they are less expensive over short distances and can provide a door-to-door service. The ease with which residents can access a public transport mode from their home varies according to the availability of roads and public transport in the district in which they live and access and egress segments made on foot may be long. Walking access and egress times allow us to identify which

[1] The PMU survey was carried out by a team composed of French and Cameroonian researchers, including the authors of this paper, who were responsible for the project's general methodology, in particular the survey questionnaire.