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COLLECTION OF PASSENGER TRAVEL DATA IN SUB-SAHARAN AFRICAN CITIES: TOWARDS IMPROVING SURVEY INSTRUMENTS AND PROCEDURES

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ABSTRACT

This paper compares experiences in the application of different approaches to passenger travel data collection in francophone and anglophone cities of West, Central and Southern Africa. Its aim is to identify possible improvements through which common problems might be addressed. The paper draws from the available French and English literature on survey methods applied in Sub-Saharan Africa, as well as from the authors' experiences in designing and administering surveys in this context. Problems are discussed in terms of survey design and administration. Recommendations to address these problems relate to survey preparation, comparative instrument and cognitive testing, hierarchical multi-modal methods, interviewer selection and training methods, and survey administration and monitoring.

Key words: African cities, passenger travel surveys, household surveys, methods

Abbreviated title for running headline: Travel data collection in Sub-Saharan Africa

1. INTRODUCTION

The collection of reliable and instructive data on passenger travel behaviour is a complex and multi-faceted task, the difficulties associated with which are the subject of a substantial international body of academic research (see for instance Richardson et al., 1995, and Stopher and Jones, 2003). It will be argued later in this paper that the conditions within which travel data are collected in Sub-Saharan African cities makes this task especially difficult. The body of academic research dealing with the difficulties encountered in collecting travel data in this specific context is, however, unfortunately limited and fragmented along the lines of language. In particular, there have been few, if any, past attempts to compare travel survey methods and experiences in the francophone and anglophone countries of West, Central and Southern Africa. The purpose of this paper is therefore to initiate an exchange of the experiences and expertise gained through the application of various methodological approaches within these two geo-linguistic contexts, with the aim of recommending ways in which common problems might be addressed. The paper draws from the available French and English literature on travel survey methods applied in Sub-Saharan Africa, as well as from the combined experiences of the authors in designing and administering household travel surveys since the nineties in cities of Burkina Faso (Ouagadougou in 1992), Mali (Bamako in 1993), Niger (Niamey in 1996), Senegal (Dakar in 2000), South Africa (Cape Town in 2000-2001) and more recently in Cameroon (Douala in 2003) and Guinea (Conakry in 2003) (Godard et al., 1993; Pochet et al., 1995; Diaz Olvera et al., 1998; Diaz Olvera et al., 1999; Syscom, 2001; Diaz Olvera et al., 2002; Behrens, 2002; Sitrass, 2004b; Sitrass, 2004c).

The paper is divided into four sections. The next section briefly reviews the travel survey methods that have been applied in selected Sub-Saharan African countries. Section 3 then reviews the available literature and draws from the authors' experiences in West, Central and Southern African cities, to identify the problems that have commonly been encountered in the design of household or personal travel survey instruments, and in the procedures through which surveys are administered. Section 4 discusses the improved practices and associated research agenda required to address the problems identified. Section 5 concludes with comments on the need for an exchange of experiences and on the transferability of lessons.

2. TRAVEL SURVEY METHODS APPLIED IN SUB-SAHARAN AFRICAN CITIES

Despite sometimes considerable political and socio-economic differences, West, Central and Southern African cities appear to share similar conditions within which household and personal travel surveys are administered. These conditions, relating to education levels, diverse cultures, rapid urbanisation and invasive politics, will be elaborated upon later. While they are not necessarily unique, they do make the administration of surveys to collect reliable and instructive data an especially difficult task relative to other parts of the world. Within this challenging context a perhaps surprising number of passenger travel survey methods have been applied, or at least tested, in West, Central and Southern African cities. Table 1 summarises, to the best of the authors' knowledge, the range of methods applied in selected countries over the past two decades. The table indicates this methodological variety in terms of the nature of the sampling unit, the site at which the survey takes place, the time period for which travel data is collected, the data collection procedure

followed, the type of survey instrument used, and the types of questions asked in questionnaires.

Table 1. Range of passenger travel survey methods applied in selected West, Central and Southern African countries

While it can neither be claimed that the countries included in the table are representative of all West, Central and Southern African countries, nor that the table is entirely comprehensive, a clear indicative pattern does appear to emerge. The table shows that the wealthiest country and with the higher degree of development[1] has been able to apply more sophisticated and a wider range of alternative survey methods. It should be noted, however, that the frequency and sophistication of travel surveys is not homogeneous within individual countries. Larger, more developed cities, experiencing greater access and congestion problems, administer passenger travel surveys more than smaller, less developed cities within the same country. In addition, more developed cities with formal, scheduled public transport operations require reliable data on travel demand and trained staff for the application of specific transport data collection methods. This is the case of Cape Town (about 3 million inhabitants) for instance, where most public transport services are supplied by the formal sector. In other cities where public transport is either solely supplied by unregulated private operators, or at best, formal and informal operators coexist but the share of formal sector operators in overall provision remains limited, passenger travel data are less frequently collected. For instance, in Dakar (about 2.5 million inhabitants), when the public transport company still operated[2], state and city authorities were concerned with transport regulation and planning, and some funding

from international agencies was thus allocated to planning studies within which travel surveys were carried out. After the termination of the public transport company passenger travel data collection effectively ceased.

The table also shows that the most commonly applied passenger travel surveys in West, Central and Southern African cities are personal or household surveys conducted in the home, using pen and paper questionnaire interviews which incorporate trip diary or trip-related questions occasionally supplemented with a variety of quantitative, qualitative or attitudinal questions. It is only in South Africa that the more complex activity diary or stated preference survey methods have been applied or tested in recent years (e.g. Arentze et al., 2004; Behrens, 2003; van Zyl et al., 2001).

3. COMMON PROBLEMS EXPERIENCED IN SUB-SAHARAN AFRICAN TRAVEL SURVEYS

What then have the authors' experienced, and what has been recorded in the available literature, as the main problems encountered in applying these passenger travel survey methods within the West, Central and Southern African context? These problems are categorised below in terms of survey design and survey administration, and are summarised in table 2.

Table 2. Problems experienced in West, Central and Southern African passenger travel surveys

3.1 Survey design

Several problems concerning survey design can be identified. While most of them are common to surveys whatever their field, we focus on problems experienced in travel surveys.

Sampling unit

The household is the sampling unit in a number of qualitative and quantitative surveys but the definition of the household remains a frequent problem. Gil and Omaboe (1993, cited in Van der Reis and Lombard, 2003), for instance, provide the examples of a ‘household’ and a ‘family’ which take different forms in different African cultures. In western societies these terms are generally equivalent, and the family usually refers to the ‘nuclear’ members (i.e., parents and children living in the same dwelling). In many Sub-Saharan African countries, this definition, based on biological or family ties, is not relevant given that the nuclear family, members of the extended family (nephew, mother…, of the head) and people having no family ties with the head of household, for instance servants or persons coming from the same village, frequently live in the same dwelling.

The financial relationships are not sufficient either for the definition of the household, because firstly, the pooling of individual monetary resources is partial (Haddad et al., 1997; Mattila-Wiro, 1999), and, secondly, monetary transfers or ‘gifts’ are frequent amongst individuals living in different dwellings. The household surveys in Douala and Conakry estimate that three individuals (aged more than 10 years old) out of ten regularly receive money from people not living in the same dwelling. For instance, a child of the head of household attending the university may

receive a weekly or monthly allowance from an uncle to help with the financing of his or her day-to-day expenses (Sitrass, 2004a).

In most household surveys in West and Central Africa, the definition of the sampling unit is then usually based on two factors: that a group of persons live in the same dwelling and that they share at least one meal per day, which means that they depend, at least partially, on a common household budget (Blaizeau and Dubois, 1989).

According to this definition of the household, the size of the household may be considerable in some cases, particularly in the Sahel cities. Households of 10 persons or more represent 31.0 percent of households in Dakar, 26.5 percent in Bamako, 19.4 percent in Niamey and 14.1 percent in Ouagadougou (Blaizeau, 1999). Moreover, the size and composition of joint households vary considerably with time and for some people living in the same dwelling there is an uncertainty about who may be considered as a permanent household member and who not, and therefore, who should be surveyed and who not. The difficulty of clearly identifing the household and the large size of households makes fieldwork more complicated. Very often all the eligible members in larger households are not interviewed, because some of them are continuously absent, even though the interviewer makes a number of visits to the household.

Sampling frame

The acquisition of an accurate sampling frame from which to draw a representative sample is a frequent difficulty (Godard, 2000; van der Reis, 1997; van der Reis and Lombard, 2003). Databases from which to design surveys and prepare sampling

frameworks are often either poor or unavailable. In some cases, scarcity of human, financial and material resources make it difficult for local agencies to properly manage databases and related materials, and data is either useless or lost within a few years. In other cases, statistical data useful for developing survey frameworks is frequently held by agencies not related to the transport sector and are not available to survey organisers and researchers.

In addition, because the socio-economic contexts of African cities change rapidly relative to more developed countries, even good quality databases soon become outdated and unreliable. A useful data source would clearly be population censuses, but in many Sub-Saharan countries they are undertaken irregularly, when funding is available, and in most cases data are available only several years later. The unmonitored growth of many cities through unplanned settlement, migration, natural disasters and wars changes the size and shape of the city in a relatively short period of time. At a micro-level, household structures are frequently dynamic, including extended family and non-family members for periods of time associated with access to employment, seasonal labour patterns, social obligations, or even illness. Employment opportunities and more generally, livelihood activities, are also extremely variable and so are household and personal incomes. Thus, incomes vary significantly even during a short period of time and ranking households and individuals by income may be quite unreliable in some cases.

Convenient listings of the target population are also frequently absent due to the fact that many neighbourhoods are informal settlements, that many households do not pay municipal property rates or income tax, and to low fixed telephone ownership. Furthermore, identification of household location is difficult. In most West, Central

and Southern African cities many households do not have a residential address. In the often considerable informal settlements of these cities, and even in some formal districts, streets are unnamed and houses are unnumbered. In addition, in formal residential areas backyard shack accommodation and the subletting of rooms within formally constructed dwellings is common.

For some studies, if funding is provided, data are partially updated by fieldwork in selected enumeration areas which can then be considered as the sampling frame, as was the case in the Dakar survey. However, in most cases, the selection of survey zones is made on the basis of an in-depth analysis of available data, supplemented by different hypotheses or assumptions regarding demographic and urban change.

Instrument cognition

In the context of low levels of education and associated poor levels of literacy and numeracy, designing survey instruments that can be understood by respondents is a difficult task when questionnaires are administered by an interviewer, and even more difficult when self-completed. An often cited problem in self-completed questionnaires is an inability of respondents (and in some instances by supervisors and interviewers as well) to read and complete diary tables as a series of intersecting columns and rows (Behrens, 2003; van der Reis, 1997). Less educated respondents are not always familiar with the concept of filling answers in designated spaces, which often results in the intended answer to one question being filled in the space intended for the answer to another.

In the case of a self-completed activity diary pilot test in Cape Town, Behrens (2003) cites the example of a respondent recording in the table that the first activity of his

24 hour day was sleeping, and that this was done by minibus-taxi two to three times a week. Further common errors associated with an inability to complete tables were a lack of symmetry between forward and return trips recorded in diaries (e.g. the forward journey might include a walking trip to a bus station and a bus trip, whereas the return journey, between the same O-D pair, indicates only a bus trip) and a failure to account for time continuously over the 24 hour survey period. Interestingly however, in this case, leave-behind self-completion activity diary tables were found to be too elaborate for respondents across all sample stratifications. Amongst respondents with lower education levels, it was found that tables are often difficult to read and complete. Amongst respondents with higher education levels, it was found that completion instructions are seldom read, with the consequence that unless correct diary table completion is easily self-evident, they are often completed incorrectly.

Equivalence

The diversity of socio-cultural groupings within many Sub-Saharan city populations often necessitates that surveys are simultaneously administered within multi-lingual and multi-cultural sub-samples, resulting in a frequent difficulty in achieving equivalence in survey instruments. Van der Reis and Lombard (2003) identify three principle forms of equivalence problems: linguistic, conceptual and measurement equivalence. Frequently these problems are closely related and their individual effects are difficult to identify.

Problems of linguistic equivalence are encountered when equivalent terms for the same concept are difficult to find in all the languages within which the survey is

conducted. Morris and van der Reis (1986) for instance, in a cognitive study of transport terminology, found that it was often difficult to find terms with precisely the same meaning in the various South African languages. The term ‘convenient’ for example was most frequently interpreted to mean ‘close to home’ by English-speaking respondents, whereas when translated into Afrikaans as ‘gerieflik’ was most frequently interpreted to mean ‘uncrowded’ by Afrikaans-speaking respondents, and when translated into isiXhosa as ‘lungile’ was most frequently interpreted to mean ‘close to work’ by isiXhosa-speaking respondents (see figure 1). Achieving such linguistic equivalence compounds the already difficult task, even within one language, of translating technical terminology used by transport professionals into the everyday language used by the target population (Lorenzi-Cioldi, 2003).

Figure 1. Meanings attributed to the term 'convenient' by English-, Afrikaans- and isiXhosa-speaking respondents (van der Reis, 1997)

Problems of conceptual equivalence are encountered when cultural constructs are different. With regard to the composition of the household, for instance, the definition of the relationship to the reference person (usually the head of household) may be complicated because of the combination of problems concerning linguistic and conceptual equivalences. For instance, in some West African cultures, the local terms for ‘father’ (‘*père’*) and ‘mother’ (‘*mère’*) refer to the father and uncles, and the mother and aunts, respectively. Similarly, a ‘son’ (‘*fils’*) or a ‘daughter’ (‘*fille’*) may be a nephew or a niece. In other cases, a term expressing a family relation may also apply to people without family ties, i.e. the term ‘*brother’* (‘*frère*’), which may

be used to refer to a ‘biological’ brother, to someone from the extended family or to someone with no family relation (e.g. someone from the same village or a member of the same age group).

In largely informal sector economies the problems of conceptual equivalence are clearly observed with regard to estimating individual incomes. It is difficult to determine an average value if income is irregular in timing and amount, and also because of unfamiliarity with the notion of employment status or participation in the labour market. In fact, many respondents consider that their income-earning activities are not ‘real’ jobs because they are self-employed, unskilled, sporadic, low-remunerated, or related to traditional female activities, and when asked if they have a job they say no. This problem is more acute amongst women and it introduces a gender bias in survey samples. In the field of transport the measure of living standards of individuals and households is necessary in, for instance, the ranking of individuals and households according to wealth and the analysis of capacities to afford daily travel expenditure (Diaz Olvera *et al*, 2001). At the individual level, simple and judicious methodologies to identify employment status and calculate incomes of informal sector workers are still to be perfected. At the household level, consumption expenditure is sometimes used to measure living standard, but on the one hand data collection increases respondent burden considerably, and on the other, it cannot be applied at the individual level. Other data such as housing characteristics, access to water and electricity or household assets can be used as a complement or a proxy of household living standards.

Problems of measurement equivalence are encountered when some respondents are unfamiliar with the units of measurement used in the questionnaire. Van der Reis

(1984, cited in van der Reis and Lombard, 2003), for instance, found that many low-income black South Africans were neither familiar with the concept of a rating scale nor with degrees of comparison, whether in pictorial, numerical or verbal form. This problem may also be closely related to conceptual or linguistic equivalence given that often the exact translation is not available from one language to another. For example, in Douala, the following question was formulated in the household questionnaire: 'During the past 12 months have you had problems satisfying the need for food in your household?' ('*Vous est-il arrivé au cours des 12 derniers mois d'avoir des problèmes pour satisfaire les besoins en nourriture du ménage?'*). A similar question had been formulated in surveys in cities from other African countries and the aim was to make cross-city comparisons. Therefore, the scale of comparison for the response had to be maintained: always / frequently / sometimes / rarely / never (*toujours / souvent / quelquefois / rarement / jamais*). However, the difference in local French between "sometimes" and "rarely" is in fact very slight.

Concept familiarity

A lack of familiarity with key concepts in survey instruments render poorly educated respondents unable to provide meaningful responses to questions posed, with associated impacts on data reliability. Van der Reis (1997) provides the example of a question which asks 'if the roads in your area were improved, would this benefit you?'. She argues that such a question is very difficult to answer for a person who has never previously considered, say, the relationship between transport conditions and the cost of goods and services or the cost of fares. This is partially due to the fact that travelling or the transport of goods is not an activity per se; in the first place it is

only the means to undertake out-of-home activities, and in the second, to make goods available in a particular place.

Behrens (2003) found that poorly educated respondents had difficulty providing answers to questions concerning the distance they travelled on a particular trip. For people unfamiliar with map reading and scale, estimating how far they travelled is clearly difficult. Interestingly, few people were found to have difficulty indicating for how long they travelled on a particular trip – indicating that estimating and monitoring time use is a much more universal skill than estimating travelled distance due to the fact that time is measured by a widely used instrument (i.e. the watch or clock). Moreover, even if some people do not have such articles, other means, such as radio programmes, meals, or daily prayers amongst Muslim populations, help to objectify the measure of time or at least to have a temporal reference. Similar instruments to measure distances or obtain a spatial reference are not developed. The widespread usage of watches, clocks, radios and more recently cellular telephones has certainly helped to improve perception of time. Concerning francophone surveys, difficulties in determining the time of the trip and how long it takes were clearly more frequent during the earliest survey, that of Ouagadougou in 1992 than in the more recent ones (Dakar, Douala and Conakry).

Respondent burden

An unfamiliarity with concepts or terminology in survey instruments often results in surveys with poorly educated respondents taking up a lot of time – with interviews sometimes lasting for a number of hours, particularly in the largest households. In some other cases, especially amongst low-income households, individual interviews

are long and difficult because they are often interrupted as respondents have to care for children, prepare meals, attend to their petty-trade activity, etc. or simply because their mind is occupied with daily problems. This respondent burden impacts negatively upon item non-response rates and data reliability as respondents become frustrated or weary and attempt to hurry through later questions in order to bring the interview to a close (Ampt, 2003). In some West African cases where particular neighbourhoods have been subjected to numerous surveys, respondents have complained that surveys are useless as nothing has improved in their daily lives, as happened in Ouagadougou and more recently in Dakar. As a result, such respondents typically provide hurried and unreliable answers or refuse outright to participate in the survey. In the case of self-completed diaries in Cape Town some respondents who initially agreed to participate in the survey, subsequently failed to complete their diaries once the effort that was entailed became clear (Behrens, 2003). In West African surveys, especially in the largest households, even if the head of household agrees that his or her household be surveyed some members refuse to participate. Some members say so explicitly when the interviewer tries to make an appointment, but most make appointments and are absent when the interviewer arrives. This refusal and the unavailability of all eligible members in large households, as mentioned above in the section on Sampling unit, clearly modifies the representativity of the data base. To limit this bias, in the Cape Town survey interviewers were instructed to substitute households if less than 70% of members could be interviewed.

Hypothetical alternatives

Applications of hypothetical, or stated preference, surveys in South African cities have found that poorly educated respondents often struggle to consider hypothetical alternatives. Van Zyl et al. (2001), for instance, report a reluctance amongst poorly educated respondents to choose a hypothetical alternative mode from the one currently used, under almost any circumstances. They also report a tendency for respondents to ignore all the attributes presented to them except for a few dominant ones, and found that respondents experienced a general difficulty in considering a large number of alternatives and attributes.

As far as we know, hypothetical or stated preference methods have never been undertaken in the field of transport in the West African context, but have been used in other fields like living conditions and family planning surveys. Attitudinal questions in more conventional travel surveys, however, have encountered similar problems. Some surveys have included questions relating to respondents' attitudes to different travel modes. For each selected mode, the respondent is asked to cite its main attributes from a list of eight. As there are four or five selected modes (and ten in the Dakar survey) the whole process seems quite long for some respondents as they do not understand why the 'same' question is constantly repeated, especially when all the modes are not available to them or their lack of personal experience of the mode makes conceptualising its attributes difficult. In the Conakry and Douala surveys this problem was overcome by considering solely the two modes of transport that the respondent uses the most.

Even in more developed countries, research findings on the analysis of responses to hypothetical alternatives are not always conclusive (see for instance Bonnel, 1995 for

France). Findings from South African experiences suggest that if this type of survey or question is to be used in African contexts, special attention must be paid to a simple formulation of questions, alternatives and attribute levels. It should be taken into account that the majority of populations, i.e. low-income populations, live from day-to-day and consider their living conditions with some kind of fatalism. It is then very difficult for them to envisage alternatives.

3.2 Survey administration

Similar to the above problems concerning survey design, those with regard to survey administration concern surveys generally but here they will be discussed with respect to travel surveys specifically.

Interviewer training

The lack of reliability and competency of interviewers has proven to be a significant obstacle in the collection of good quality data, often resulting in the need to replace and retrain high proportions of interviewers and supervisors in surveys (Behrens, 2003; Godard et al., 2001). Without adequately prepared and dependable interviewers, the best prepared survey procedures and most carefully designed survey instruments will continue to yield poor data quality. Of course this is true for surveys in any field and in some cases training requires up to four weeks (Glewwe, 2005b).

Experience in West and Central African travel surveys has shown that professional interviewers usually have a good understanding of questionnaires inquiring on the socio-economic characteristics of households or individuals. Conversely, they are not familiar with questions on travelling. Very often the available number of experienced

professional interviewers is not sufficient, mostly because other surveys are being undertaken at the same time, and beginners are hired (e.g. students and unemployed graduated persons). The aim of training is then to ensure that all interviewers (professionals and novices) and supervisors, have the same level of knowledge about the objectives of the survey, the contents of questionnaires, the behaviour they should exhibit towards respondents, etc.

Survey protocol

Political interference in surveys sometimes results in considerable delays, and 'gate-keeping' by local political leaders prevents researchers and fieldworkers from gaining free access to target populations. Such delays and restrictions are exacerbated in times of political, economic or social unrest, which serves to raise suspicion amongst local politicians and community leaders of interviewers and the surveys they are administering, which in turn intensifies their desire to control the type and nature of outsider access to the communities within which they hold leadership authority. This complicates fieldwork further and can reduce the quality of collected data. In such contexts it is not always clear which people within a local community should be informed of a travel survey, when, and in what sequence, in order to obtain the necessary consents and avoid later disruptions.

Respondent distrust

Survey respondents are often suspicious of the purpose of a travel survey, resulting in refusal and the need for widespread respondent substitution and the introduction of associated sampling biases. It is not always clear to respondents why, in a travel survey, they are asked questions concerning variables like level of education,

household income, age, etc. This distrust or suspicion is often compounded by a lack of knowledge of the concept of a questionnaire survey. In some cases respondents refuse outright to participate in surveys – particularly with regard to answering questions relating to employment status and income – because they fear that the information they provide might be used for other purposes (e.g. to check whether income taxes have been paid). Some subjects such as property status may be quite sensitive, especially if the survey area is located in an informal settlement where land tenure is a contentious issue from political, economic and social perspectives.

In Cape Town, Behrens (2003) found many high- and middle-income households refused to participate in an activity diary survey on the grounds that they would be providing information on when their homes would be empty and thus exposed to housebreaking, or that by providing information on the vehicles they owned this too would make them more vulnerable to theft. This attitude prevailed despite assurances of confidentiality, and a formal covering letter noting the approval of the survey received from Ward Councillors and relevant civic or resident organisations. Figure 2 illustrates that substitution rates in this survey were considerably higher amongst wealthier households more fearful of property crime. In West Africa this problem was not relevant given that surveys were undertaken in cities where crime rates are low compared to other Sub-Saharan cities.

Figure 2. Reasons for household respondent substitution in a Cape Town activity diary survey by income band (Behrens, 2002)

Interviewer bias

In the context of multi-ethnic samples, the racial, cultural, and gender profile of interviewers relative to respondents has been found to be another important factor in determining the successful administration of surveys and reducing unit non-response rates and the associated need for high rates of substitution. Behrens (2003) for instance found that in the context of the real or perceived crime rate in Cape Town, and the attendant cross-ethnic prejudices and stereotypes, it was important that interviewers and respondents are of the same ethnic group. In a pilot test of areas where this was not the case, and more specifically where 'Black' interviewers were interviewing 'White' or 'Coloured' respondents, very low response and co-operation was received.[3] In a predominantly White residential area, only one in nine households agreed to be surveyed. In a predominantly Coloured residential area, one in five households agreed to be surveyed. By comparison, in a predominately Black residential area, but where interviewers were all Black, the equivalent ratio was one in two.

In Nigeria, Mitchell (1973, cited in Van der Reis and Lombard, 2003) similarly found that the relationship between the interviewer and the respondent had a significant impact upon refusal and interviewer bias. He found that the lower the status of the respondent relative to that of the interviewer with regard to the variables of gender, education and age, the greater the level of non-cooperation. He found, however, that if there was a good match in status between respondent and interviewer, if the study's purpose was properly explained, and if the household head's permission to interview family members had been obtained, refusal rates were generally extremely low (in the region of only 0.5%).

In some contexts, the gender profile of the interviewer is an important factor for the head of household or other respondents to agree to participate in the survey. This is particularly the case in cultural and religious conditions or subject matter where it is preferable to utilise male or female interviewers. For instance, in several countries where surveys on fertility and child mortality were undertaken anecdotal reports showed that female interviewers were more easily accepted by respondents (Grosh and Muñoz, 1996).

'Adjusted' or invalid responses

Survey practitioners have often found that amongst some African societies, respondents – particularly women – are hesitant to express personal opinions in interviews, with associated impacts on data reliability. Such 'adjusted' or invalid responses can also occur as a result of the respondent's desire, out of politeness, to give what he or she perceives to be the 'right' answer, or an answer that the interviewer is perceived to want. Questions related to attitudes or opinions are mostly affected by this problem.

The presence of other people during the interview can also impact upon the reliability of the data collected. Bulmer (1993, cited in Van der Reis and Lombard, 2003) for instance found that in the presence of others, respondents were likely to distort their answers to conform to the prevailing norms and values of their society. That is why West African survey procedures typically insist that interviews with individuals take place privately. In a few traditional households in Niamey, the head of household wished to be present during his wife's (wives') interview and moreover, he wished to have an intermediary role between interviewer and

respondent. In those cases, if the interviewer did not succeed in convincing him that the interview should be private and confidential, the household was substituted.

Fieldwork logistics

In the context of poor transport systems and scarcity of land-line or cellular telephones, maintaining constant lines of communication between researchers, fieldwork supervisors and interviewers is a difficult task. In particular, an ability to monitor fieldwork through back-checks is compromised. Fieldwork quality is also clearly compromised in instances when, due to insecure funding, data collection has been abruptly cut short or completed with undue haste with associated impacts on back-checking and monitoring.

4. IMPROVING SURVEY INSTRUMENTS AND PROCEDURES

How then might the common problems experienced in West, Central and Southern African passenger travel surveys identified in the preceding section be overcome? More specifically, what might be regarded as current good or best practices able to address these problems? The magnitude of the obstacles confronting reliable and instructive data collection in Sub-Saharan African cities identified implies that, in some instances at least, good or best practices are not readily identifiable. Consequently, research independent of specific data collection projects, undertaken for the purposes of developing survey methods appropriate to this context, would be of great benefit. We thus supplement discussion on what might be regarded as good or best practice with suggestions for necessary future exploratory research that develops and tests promising survey instruments and procedures where no obvious best practice exists. We discuss best practices and associated research needs in terms

of five broad themes: survey preparation; comparative instrument and cognitive testing; hierarchical multi-modal methods; interviewer selection and training methods; and survey administration and monitoring.

Survey preparation

The experience of passenger travel surveys in the West, Central and Southern African context indicates that best practice includes careful analyses of the political and cultural milieu within which data are to be collected so that protocols are followed which minimise the possibility of later fieldwork disruption. It has proven essential that long before data collection organisers identify all representatives of public agencies and organisations that must be informed about the survey taking place or most importantly give the necessary authorisation. For instance, in Douala, the agency in charge of urban planning (*Communauté Urbaine de Douala*) notified the prefect of the Wouri department in September about the household travel survey taking place in October. Then, letters from the *Communauté,* the prefect and survey organisers were addressed to the sub-prefect of each one of the five communities that constitute the city of Douala. Finally, organisers addressed a letter to each chief of neighbourhood (*chef de quartier*) asking for their support and indicating the selected zones where the survey would be undertaken. Contact with the last level in the administrative hierarchy is very important as fieldwork will take place in locations under its direct authority. In Niamey, for example, fieldworkers sometimes asked the chief of neighbourhood to help them convince recalcitrant heads of household to participate in the survey.

The publicity campaign some days before the beginning and during the first days of the fieldwork is essential to raise awareness of the survey and facilitate acceptance of households to participate in the survey (Grosh and Muñoz, 1996). This campaign may be initiated through the mass media (i.e. television, radio, newspapers) but less expensive local solutions may also be used. For instance, in Niamey, the community crier announced that a survey on transport was about to take place and in Conakry, the chief of neighbourhood asked the Imam to make an announcement about the survey in the local mosque.

Comparative instrument and cognitive testing

With regard to comparative instrument and cognitive testing, best practice involves thorough pilot- and pre-testing of survey instruments and their back-translation in the case of multi-lingual samples. That latter implies that survey questionnaires should be translated into major local languages. It has been found that on-the-spot translation increases errors by a factor of from two to four (Scott et al., 1988 cited by Glewwe, 2005a). However, a number of African languages are unwritten and special attention may have to be paid to oral questionnaire translation during survey training and fieldwork.

Pilot- and pre-testing should be aimed at developing survey instruments and procedures that are easily understandable to poorly educated respondents with low levels of literacy and numeracy. As this is a widespread problem, the comparison of different possible instruments and procedures lends itself to research independent of individual surveys, the findings of which could be widely disseminated for mutual benefit. Important in this regard would be cognitive testing of alternative ways of

expressing concepts and terminology in different cultures, and alternative ways of asking questions and collecting data in different types of instruments. Such cognitive tests would typically involve following up pilot travel survey interviews with open-ended questions in which the respondent is requested to explain in his or her own words what he or she understood by each of the questions included in the questionnaire. The purpose of these tests would be to identify respondent difficulties and explore more appropriate and culturally sensitive methods, and in so doing, address the earlier mentioned problems of instrument cognition, equivalence, concept familiarity and considering hypothetical alternatives. A useful output of such research may be the identification and articulation of the type of 'off-the-shelf' 'core questions' proposed by Arce (2003). Comparative testing could be further expanded to explore different ways of reducing unit and item non-response rates and associated sampling bias. Envisaged here is a test in which the impact of survey length and question ordering on respondent burden and on item non-response and data quality is measured. Such a test would also need to measure and draw conclusions regarding the impact that the provision of various types of incentives might have on rates of unit non-response.

Hierarchical multi-modal methods

In the absence of any clear current best practice (with the possible exception of the Dakar survey in which funding was made available to establish a sampling frame), research will be required to develop data collection methods suited to the context of poor pre-existing data, inadequate sampling frames, and limited human and financial resources. What is envisaged here is a hierarchy of interrelated survey instruments ranging from simple quantitative questionnaires administered easily and cheaply to

large samples at one end, to more complex diary and qualitative questionnaires administered to smaller samples with greater difficulty and expense at the other (see figure 3). The former instruments would compensate for poor pre-existing databases by providing data with which later smaller samples can be designed, as well as highly representative and reliable data on a limited number of key socio-economic and travel variables at the household and individual levels. The latter instruments would yield more diverse and higher quality data, but drawn from smaller, less representative samples. Such a multi-modal survey in which statistical representivity is traded off against in-depth data, and *vice versa*, would appear preferable to poorly administered larger surveys in which data are numerous but ubiquitously less reliable.

Figure 3. Proposed hierarchy of interrelated survey instruments to compensate for inadequate pre-existing data

Interviewer selection and training methods

It is clear that interview surveys represent better practice in the majority of Sub-Saharan contexts than self-completion surveys. While the use of interviewers clearly does not solve all problems related to instrument cognition, they do offer greater control over data reliability. In more developed countries, most surveys (including censuses) are self-completed for several reasons such as the large size of the sample, a short survey period, the high cost of wages to interviewers, etc. In developing countries, prevalence of low rates of education may seriously compromise the quality of data in self-completed questionnaires and questionnaires administered by

interviewers would generally be more appropriate. Confidentiality or ‘autonomy’ in answering some questions, such as detailed descriptions of trips or attitudinal items, is more problematic in self-administered questionnaires. Interviewers can identify inconsistencies between responses to different questions during interviews and then verify them with the respondent.

The importance of interview surveys in the Sub-Saharan context raises the issue of best practices in interviewer selection and training. The experience of the West African surveys reviewed suggests that difficulties concerning translation of terms and concept familiarity can be overcome through extensive training over up to five days in which special attention is paid to, amongst other things, the comprehension of technical terms on travelling useful for the survey (e.g. mode, trip, trip chaining, trip purpose, main travel mode, segment of multi-mode trip, outward/return trips, etc.) and to the importance of trip chronology in travel data collection (see for instance Diaz Olvera et al., 2002, for common errors committed by interviewers in the collection of the day before travel data in the Dakar survey). Several examples and exercises, taken from real life (i.e. volunteer interviewers relate their activities and trips of the day before), are useful in illustrating what data one is looking for and how to fill in the questionnaire. At the end of the training period, a written test is administered to interviewers and then they go for a field test and interview one or two households. These questionnaires are then examined thoroughly by survey organisers to detect particular problems and eventually to repeat explanations of problematic questions or items. Both tests can be used for the final selection of fieldworkers.

Further research is required to formalise improved interviewer training methods, as a way of addressing the problems of interviewer reliability and competence, as well as of enabling trained interviewers to deal better with problems of interviewer bias and invalid responses. Such research would need to test the efficacy of alternative training methods, and could usefully produce a interviewer training field manual as an output.

Survey administration and monitoring

When determining the composition of fieldworker groups, best practices take into account, among other factors, the diversity of ethnic groups and languages spoken in surveyed areas as a way of limiting interviewer bias and reducing non-response rates. In West African surveys in areas where traditional Muslim populations are numerous, for instance, interviewer groups include at least one female given that amongst the most traditional households the male head of household, or even some women of the household themselves, are reluctant that men interview women. In Niamey and Conakry, professional interviewers adapted their way of dressing to the type of household: ‘traditional’ or ‘modern’. In Cape Town, care was necessary to match the ethnicity and language of interviewers with those of respondents as much as possible. Other practical factors that may be taken into account in the composition of fieldwork groups are the familiarity of the interviewer with the survey area and the proximity of his or her home to this area.

In extreme cases interviewers regarded as outsiders by a community may face real safety risks. In Western Africa, when the survey takes place in areas reputed to be dangerous, interviewers must indicate precisely to their supervisor the location of

households where they will be administering the questionnaire. They are also advised to leave the area early in the evening even if this limits access to respondents later in the evenings when they are most likely to be available. In Douala, interviewers requested that they work in groups of at least two in order to ‘feel secure’.

Best practices during fieldwork also include back-checking and interviewer debriefing throughout the survey period to ensure that survey procedures are followed, to enable unreliable and incompetent interviewers to be replaced when necessary, and to ensure the quality of collected data. Monitoring of fieldwork is usually undertaken by supervisors while monitoring the quality of collected data and the characteristics of the survey sample is undertaken by survey organisers. Back-checks are essential and experience in West Africa has shown that they must be done rigorously from the beginning of surveys. As a result, mistakes in the comprehension of questions or in completing questionnaires may be detected rapidly and either the interviewer or supervisor improves his or her work or he or she is replaced. To do this, regular meetings of fieldworkers and survey organisers are scheduled from the start of the survey and fieldworkers submit completed questionnaires as soon as possible for checking. In Dakar, for instance, survey organisers did not schedule such meetings and back-checks with interviewers had to take place in the street with obvious difficulties. In Niamey, meetings with fieldworkers took place regularly and survey organisers were available at the scheduled time and venue everyday during the survey period. In Douala and Conakry, a similar procedure was adopted. As cellular telephone use is expanding amongst the populations of several Sub-Saharan African cities, communication between survey organisers and fieldworkers may become easier in future surveys, as it already happened for Douala, but it certainly cannot replace face-to-face contact. Nevertheless, a specific budget for buying

cellular telephone cards or even cellular telephones could be considered in the survey budget.

5. CONCLUSION

Given that financial resources are scarce in Sub-Saharan Africa, the experiences of the disparate and infrequent surveys and research into travel behaviour that are undertaken should be shared widely so as to derive their greatest benefit. This will require greater documentation (and translation) and exchange than has hitherto been the case. Important in considering the successes and failures of passenger travel survey innovations will be critical reflection on the transferability of lessons from one African context to another (and indeed to other developing and perhaps even developed world contexts concerned with illiterate or little educated population groups in surveys). While it is unlikely that instruments and procedures could ever be directly transferable without some adaptation to local conditions, the optimisation of available resources and the need for comparable travel data support the definition of core questions (Arce, 2003) and standards for passenger travel surveys (Stopher et al., 2004).

The main problem confronting the acquisition of reliable and good quality data is the cost of this type of innovation and reflection and the source of its funding. Until now, available funding has typically been awarded to specific projects with specific, sometimes limited, operational objectives – for instance, in Ouagadougou for the reorganisation of the state-owned public transport company, in Bamako for the development of non-motorised modes, in Dakar for the reorganisation of the urban transport system, and in Conakry and Douala to improve the travel conditions of the

poor. Only in the Niamey and Cape Town cases was research funding available for data collection with no associated specific operational objective. To derive greatest benefit from these infrequent and targeted data collection exercises it will be necessary to adapt existing, and develop new, survey methods which are suited to the dynamic and challenging context of Sub-Saharan Africa, and which seek some form of compromise between broader research and method development objectives and project-specific operational objectives.

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Table 1. Range of passenger travel survey methods applied in selected West, Central and Southern African countries

		Burkina Faso	Cameroon	Guinea	Mali	Niger	Senegal	South Africa
sampling unit	person	●	●	●	●	●	●	●
	household	●	●	●	●	●	●	●
survey site	trip attraction site							●
	on-board		●				●	●
	roadside		●				●	●
	home	●	●	●	●	●	●	●
survey period	peak period						●	●
	day(s)	●	●	●	●	●	●	●
	week							
procedure	self-completion							●
	pen and paper interview	●	●	●	●	●	●	●
	computer-assisted personal interview							●
	telephone interview							
instrument type	trip-related questions	●	●	●	●	●	●	●
	trip diary	●	●	●	●	●	●	●
	activity diary							⊗
question type	quantitative	●	●	●	●	●	●	●
	qualitative	●	●	●	●	●	●	●
	attitudinal/ranking	●	●	●	●	●	●	●
	hypothetical/preference							●

Notes: ● = practical application for the purposes transport planning or policy formation

⊗ = academic research or method test

Figure 1. Meanings attributed to the term 'convenient' by English-, Afrikaans- and isiXhosa-speaking respondents (van der Reis, 1997)

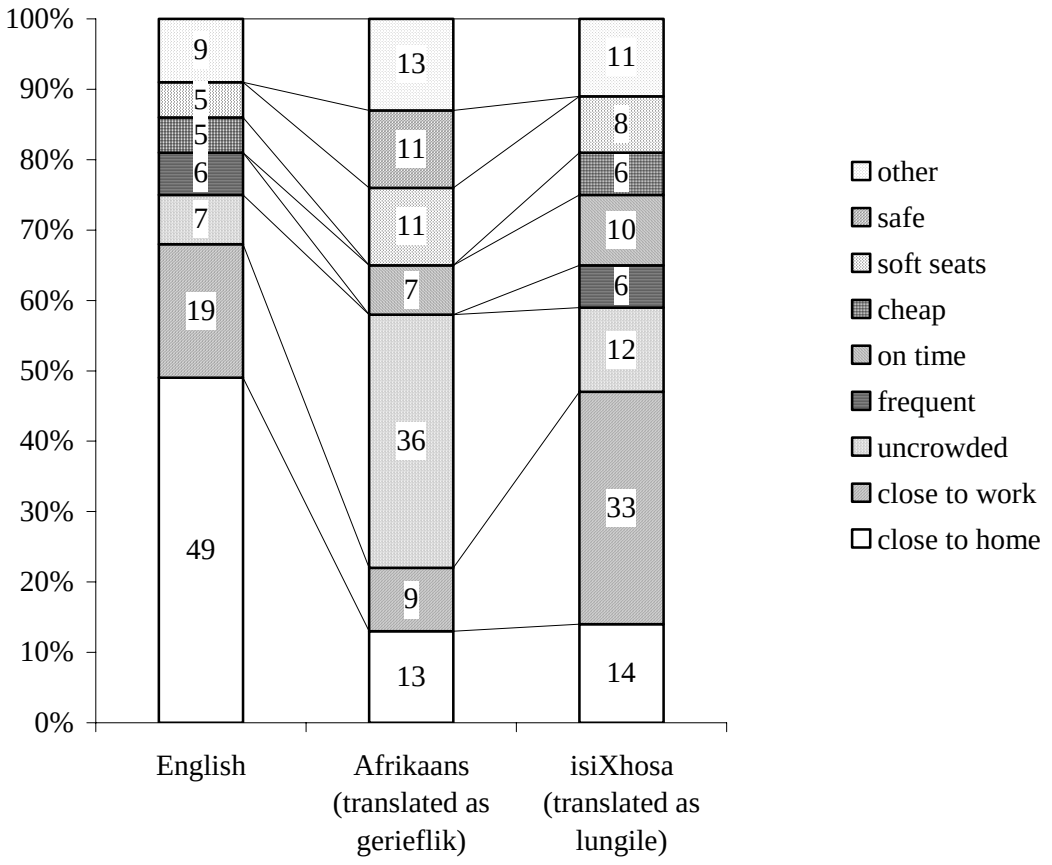


Figure 2. Reasons for household respondent substitution in a Cape Town activity diary survey by income band (Behrens, 2002)

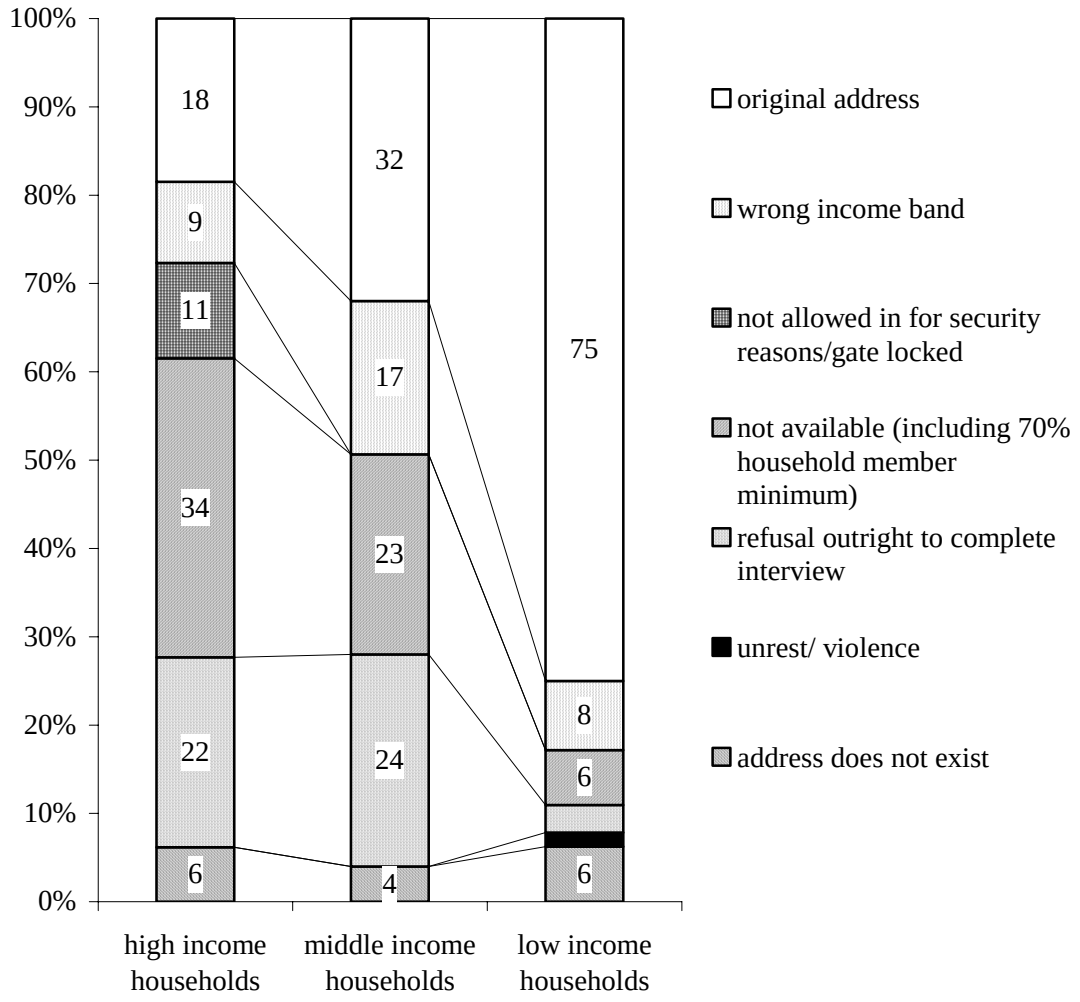
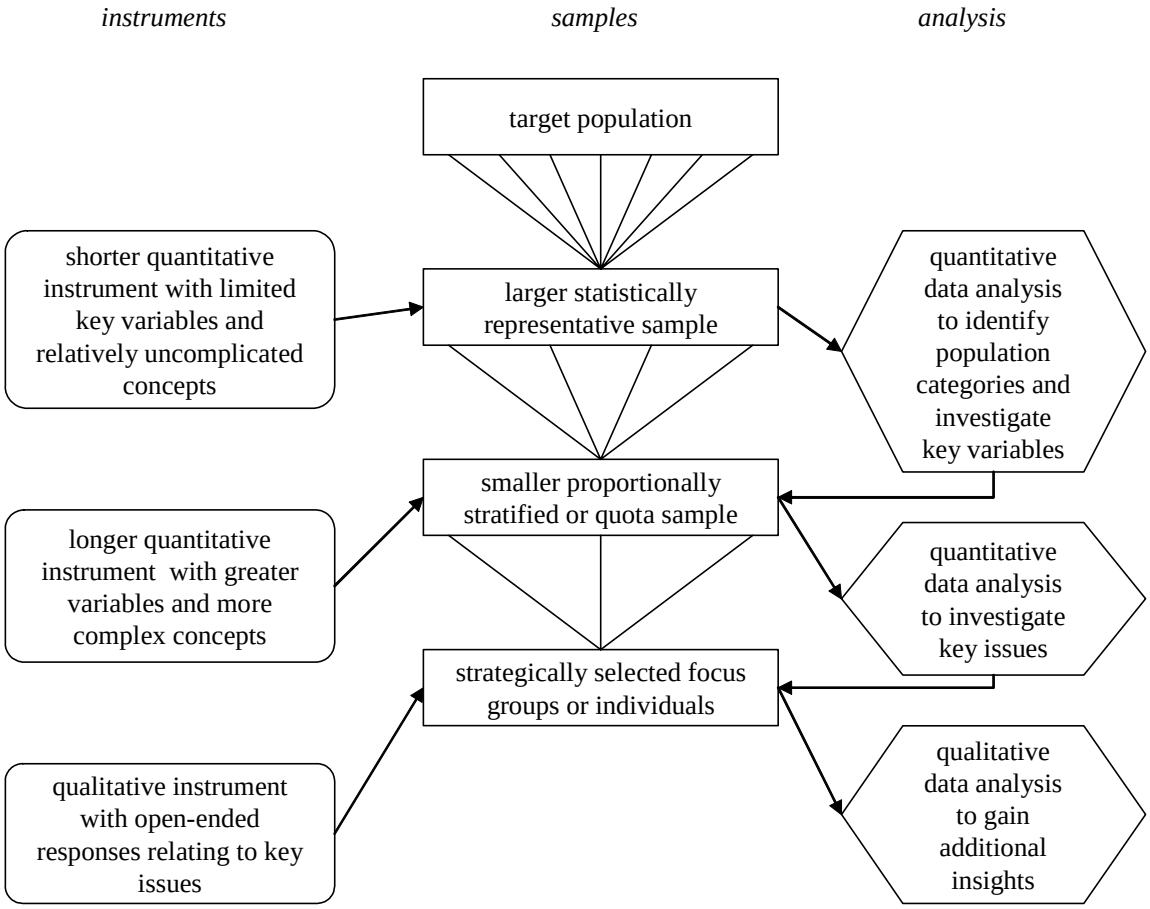


Table 2. Problems experienced in West, Central and Southern African passenger travel surveys

Survey design	Survey administration
• sampling unit • sampling frame • instrument cognition • equivalence • concept familiarity • respondent burden • hypothetical alternatives	• interviewer training • survey protocol • respondent distrust • interviewer bias • invalid responses • fieldwork logistics

Figure 3. Proposed hierarchy of interrelated survey instruments to compensate for inadequate pre-existing data



FOOTNOTES

[1] According to the World Bank's *2003 World Development Indicators* database, the gross national income/capita indicator is US$2,820 for South Africa – compared to US$490, US$410, US$220, US$230 and US$180 in Senegal, Guinea, Burkina Faso, Mali and Niger respectively. Cameroon is a little more affluent than Senegal (US$580) but probably less funding for urban and travel studies is available to Douala, the economic capital, than to Yaoundé, the political and administrative capital. According to the UNDP, the 2003 human development index shows a similar ranking. South Africa is ranked 111 out of 175 countries, while Cameroon is 142, Senegal 156, Guinea 157, and Mali, Burkina Faso and Niger 172, 173 and 174, respectively.

[2] The state-owned company SOTRAC ceased its transport activities at the end of 1999 and another operator took up activities but until now it has not managed to break into the transport market which is still dominated by the numerous regulated and unregulated operators.

[3] The population categories referred to here were established under the apartheid regime but have been maintained by the present democratic government in official documentation to provide a means of monitoring social change, particularly efforts to transform the legacy of the apartheid era. The term 'Coloured' generally refers to persons of mixed ethnic origins drawn mainly from first nation Khoi and San peoples, slaves from present day Indonesia and European colonialists; 'Black' to persons descended from one or more of the Bantu-speaking peoples; and 'White' to persons descended from European settlers.