COLLECTION OF PASSENGER TRAVEL DATA IN WEST AND SOUTHERN AFRICAN CITIES: TOWARDS A RESEARCH AGENDA FOR IMPROVING SURVEY INSTRUMENTS AND PROCEDURES

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Abstract

There have been few past attempts to compare experiences gained through the application of different approaches to passenger travel data collection in the francophone and anglophone countries of West and Southern Africa. Such an exchange of experiences and expertise would appear to have merit on the grounds that these two geo-linguistic contexts share conditions which make the collection of reliable and instructive travel data particularly difficult. The aim of this paper is to initiate such a comparison, and to identify a research agenda through which shared common problems might be addressed. In identifying common problems, 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 cities of Burkina Faso, Cameroon, Guinea, Mali, Niger, Senegal and South Africa. Problems are discussed in terms of survey design and administration. Survey design problems include: sampling frames, instrument cognition, equivalence, concept familiarity, respondent burden and hypothetical alternatives. Survey administration problems include: interviewer training, survey protocol, respondent distrust, interviewer bias, invalid responses and fieldwork logistics. The proposed research agenda to address these problems relates to: multi-modal methods, cognitive testing, testing non-response rates and interviewer training methods.

Keywords: African cities; Passenger travel surveys; Methods; Research agenda
Topic Area: D5 Data Collection Methods

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 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 identifying a research agenda through 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), where the surveys were especially focused on the travel patterns of urban poor.[1]

The paper is divided into five sections. The next section will discuss the conditions within which travel surveys are administered in West and Southern African cities in order to provide a backdrop for the subsequent discussion on experiences and problems. Section 3 will briefly review the travel survey methods that have been applied in selected countries. Section 4 then reviews the available literature and draws from the authors' experiences, 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 in West and Southern African cities. Section 5 concludes with a tentative discussion on the research agenda required to test and develop survey instruments and procedures able to address the problems identified.

2. The context of travel data collection in West and Southern African cities

Despite sometimes considerable political and socio-economic differences, West and Southern African cities do appear to share similar conditions within which household and personal travel surveys are administered. While these conditions are not unique, as mentioned earlier, they do make the administration of surveys to collect reliable and instructive data an especially difficult task relative to other parts of the world.

First among these conditions is the generally low level of education prevalent among large proportions of city populations, which limits the complexity of questionnaire designs from the perspective of making surveys understandable for both respondents and the interviewers or fieldworkers responsible for data collection.

Second is the diversity of socio-cultural groupings within city populations, often necessitating that surveys are simultaneously administered within multi-lingual and multi-ethnic sub-samples. It is therefore essential to consider this diversity right from the beginning of the survey organisation, i.e. in the sample characteristics, the questionnaire and the survey administration.

A third condition is the often poor available, or unavailable, databases from which to design surveys and prepare sampling frameworks. In low-income countries, the scarcity of human, financial and material resources often 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 its availability to survey organisers and researchers may be problematic. Also, because the socio-economic contexts of African cities change rapidly relative to more developed countries, even good quality databases soon become outdated and unreliable. For instance, the unmonitored growth of many cities through unplanned settlement 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. Also, employment opportunities and more generally, livelihood activities, are extremely variable and so are household and personal incomes. Thus, incomes vary

[1] A companion paper presented at this conference by the same authors – entitled *Meta-analysis of travel behaviour of the poor in West and Southern African cities* – presents a comparison of the findings of most of these travel surveys with particular reference to Cape Town and Dakar.

significantly even during a short period of time and ranking households and individuals by income may be quite unreliable in some cases.

A fourth condition is occasional political interference in surveys resulting sometimes in considerable delays, and 'gate-keeping' by local political leaders which prevents researchers and fieldworkers from gaining free access to target populations. Moreover, political, economic or social unrest often raises suspicion between interviewers and the sample population, which further complicates fieldwork and reduces the quality of collected data.

Finally, urban planning priorities generally do not include the passenger transport sector and funding for conducting travel surveys, whether on a cross-sectional or longitudinal basis, is scarce. The funding available is limited and insecure, often resulting in the curtailment of surveys or data analyse before their completion or undue haste in completion with associated impacts on data quality.

In most cases each of these various conditions are not observed alone and their effects are therefore cumulative.

3. Travel survey methods applied in West and Southern African cities

Within the challenging context described in the preceding section, a perhaps surprising number of passenger travel survey methods have been applied, or at least tested, in West 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.

While it can neither be claimed that the countries included in the table are representative of all West and Southern African countries, nor that the table is entirely comprehensive, a clear indicative pattern does appear to emerge. On the one hand, the table shows that the wealthiest country and with the higher degree of development[2] has been able to apply more sophisticated and a wider range of alternative survey methods.

[2] 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.

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

		Burkina Faso	Camero on	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							●
	PAPI interview	●	●	●	●	●	●	●
	CAPI 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

On the other hand, the table shows that the most commonly applied passenger travel surveys in West 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).

However, other factors closely related to the functioning of the transport sector have influenced the fact that more passenger travel surveys have been carried out in some cities than in others. Congestion and transport problems are more frequent in the larger cities than in the smaller ones and the transport issue is more at stake in urban functioning and planning. City authorities and public transport companies thus need to acquire reliable data on travel demand and trained staff for the implementation of specific transport data collection methods. This is the case of Cape Town (about 3 million inhabitants), where most passenger transport services are supplied by companies from the formal sector, Metrorail for the train service and GABS for the scheduled bus service. In the other cities, authorities do not have this need. The transport sector is left to function in a rather independent system given that public transport is either solely supplied by unregulated private operators, or at the best, formal and informal operators coexist, but the share of formal sector operators in the overall provision is anyway very limited. For instance, in Dakar (about 2.5 million inhabitants), when the public transport enterprise still operated[3], state and city authorities were concerned with transport regulation and planning, and some funding from international agencies was thus available for planning studies within which travel surveys were carried out.

4. Common problems experienced in West and Southern African household passenger 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 and Southern African context? These problems are categorised below in terms of survey design and survey administration.

4.1. Survey design

Several problems concerning survey design can be identified. However, it must be noted that most of them are common to surveys, whatever their field but obviously we will consider here these problems through the experiences of household travel surveys.

Sampling frame

The acquisition of an accurate sampling frame from which to draw a representative sample – in the context of unavailable or inadequate data, and poor database management by public authorities – is a frequent difficulty (Godard 2000, van der Reis 1997, van der Reis and Lombard 2003). The most useful data would be the population census. In many sub-Saharan countries censes are undertaken irregularly, when funding is available, and in most cases data are available only several years later. But in ever-expanding cities these data are outdated in a short period of time. Existing formal and informal residential areas are more dense and new informal settlements appear in the outlying areas or in non-

[3] The state-owned company SOTRAC ceased its transport activities in 1999 and another operator took up activities but until now it hasn't managed to break into the transport market which is still dominated by the numerous regulated and unregulated operators.

occupied zones. In addition, no convenient listing of the target population exists due to the fact that many households do not pay municipal property rates or income tax and low telephone ownership. Furthermore, identification of household location is difficult. In most West and Southern African cities many households do not have a residential address. In the often considerable informal settlements of these cities, but also in the formal districts, streets are unnamed and houses are unnumbered. Also, even 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 analyse 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 in the case of survey questionnaires administered by an interviewer, and more markedly in self-completed questionnaires. An often cited problem in self-completed questionnaires is an inability of respondents (and in some instances by fieldworkers 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 question.

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.

In more developed countries, most surveys (including censes) are self-completed due to several reasons such as the large size of the sample, a short survey period, the high cost of wages to interviewers, etc. Some of the problems mentioned above are observed but are less frequent. As said before, 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. Moreover, travel surveys are rare and populations are less familiar with surveys in this field than for instance health or education surveys. Confidentiality or ‘autonomy’ for answering some questions, such as detailed description of trips or attitudinal items, is more problematic in self-administered questionnaires. Well trained interviewers may easily identify inconsistencies between responses to different questions during interviews and

then verify them with the respondent. Nevertheless, the use of interviewers clearly do not solve all problems related to instrument cognition or others mentioned below but in the current context of sub-Saharan cities it is more reliable if adequate interviewer training is given.

Equivalence

In the context of surveys administered within multi-lingual and multi-cultural samples, it is frequently difficult to achieve 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 the effects of each one separately is 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).

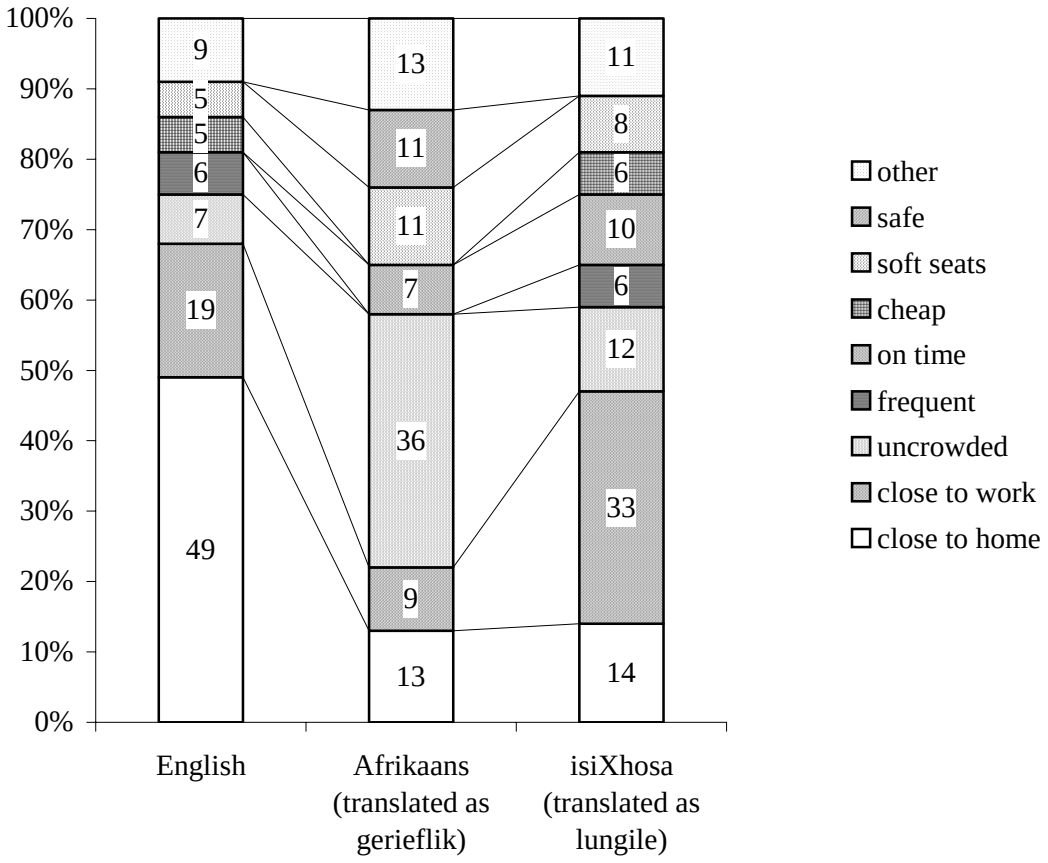

Figure 1. Meanings attributed to the term 'convenient' by English-, Afrikaans- and isiXhosa-speaking respondents (van der Reis, 1997)

Moreover, even within the 'same' language, the selection of terminology to elaborate an item has to go through at least three phases or levels: the technical vocabulary or terminology (used by specialists), the 'standard' one (which is the translation from technical terms to 'common' terms) and finally, the 'local' one (which is used with the surveyed population). If other languages are spoken by local population, an additional phase has to be considered.

Problems of conceptual equivalence are encountered when cultural constructs are different. 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 Northern countries these terms are generally equivalent, and the family usually refers to the 'nuclear' members, i.e., parents and children. In many African cultures, a household may also include members of the extended family and members having no family ties with the head of household, for instance servants or persons coming from the same village of the head of household. Size and composition in joint households vary considerably with time and for some people 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. Also, the definition of the relation with regard 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 Western Africa 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 any case, the survey procedure must state a clear definition of household.

In those contexts where the economy is based on activities from the informal sector, the problems of conceptual equivalence are clearly observed with regard to 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, 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 living standards. Even though difficulties to assess monetary wealth are still numerous, the collection of this type of information must be maintained in travel surveys.

Problems of measurement equivalence are also 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 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 place.

In West African survey questionnaires some items concern the attitude of respondents with regard to different modes of transport. One of the objectives is to 'measure' the possibility of development of non motorised modes, for instance the bicycle. 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 asked all time. Moreover, this type of question is not relevant for some respondents, either because they do not use the selected mode of transport (for instance, young people and elders who do not use public transport) or simply because it is difficult for them to consider the subject itself.

Similarly Behrens (2003) found that particularly 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 the clock. Moreover, even if some people do not have such articles, other means, such as radio programs, meals, or daily prayers amongst Muslim populations, help to objectivise 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 and radios has certainly helped to improve perception of time. Concerning Western Africa surveys, difficulties to determine 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 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. 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/her household be surveyed some members refuse to participate. Some of them say so clearly when the interviewer tries to make an appointment with him/her but most of them make appointments but are absent when the interviewer arrives. To limit this bias, in the South African survey it was stated that at least 70% of members had to 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 advocate the need for large ranges in the attribute levels presented to overcome this problem. However, they also report a tendency for respondents to ignore all the attributes presented to them except for a few dominant ones, and indeed found that respondents experienced a general difficulty in considering a large number of attributes and choices.

As far as we know, hypothetical or stated preference methods have never been undertaken in the field of transport in Western Africa context but have been used, for instance, in living conditions and family planning surveys. 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 and alternatives or 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 other alternatives.

4.2. 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 reliability and competency of interviewers has proven to be a significant obstacle to the collection of good quality data, often resulting in the need to replace and retrain high proportions of interviewers and fieldworkers 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 of knowledge.

Experience in Western Africa 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 professional interviewers is not sufficient, mostly because other surveys are being undertaken at the same time, and beginners are hired (students and unemployed persons). The aim of the training is then to ensure that all interviewers (professional and beginners) and supervisors, are at the same level of knowledge about the objectives of survey, the contents of questionnaires, the behaviour that they must have with regard to respondents, etc. Difficulties concerning translation of terms and concept familiarity may be surpassed more easily through good training.

During the training period (3-5 full days), special attention is paid to the comprehension of technical terms on travelling useful for the survey (mode, trip, trip chaining, main travel mode, segment of multi-mode trip, outward/return trips, etc.) and to the importance of trip chronology in travel data collection. Several examples, taken from real life (volunteer interviewers relate their activities and trips of the day before), are very useful to show what data one is looking for and how to fill in the questionnaire. At the end of the training period, interviewers 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. This back-checking must be maintained throughout the survey period and has proven essential in ensuring that survey procedures are followed, and in enabling unreliable and incompetent interviewers to be replaced when necessary.

Survey protocol

In the context of frequent political interference into survey research and 'gate-keeping' by local leaders, it is not always clear which people within a local community should be informed of a travel survey, and when, in order to avoid later disruptions. However, it is essential that long before the beginning of the survey organisers identify all representatives of public agencies and organisations that must be informed about the survey taking place or most importantly give necessary authorisations. For instance, in Douala, the agency in charge of urban planning (*Communauté Urbaine de Douala*) notified in September the prefect of the Wouri department 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. In other cases, as in some

neighbourhoods in Conakry, the chief of neighbourhood asked the Imam to make an announcement about the survey in the local mosque.

Respondent distrust

Survey respondents are often suspicious of the purpose of a travel survey, resulting in 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 to other purposes (e.g. to check whether income taxes have been paid). Some subjects such as property status of housing may be quite sensitive, especially if the survey area is located in an informal settlement where land tenure is an issue at stake from political, economic and/or social perspectives.

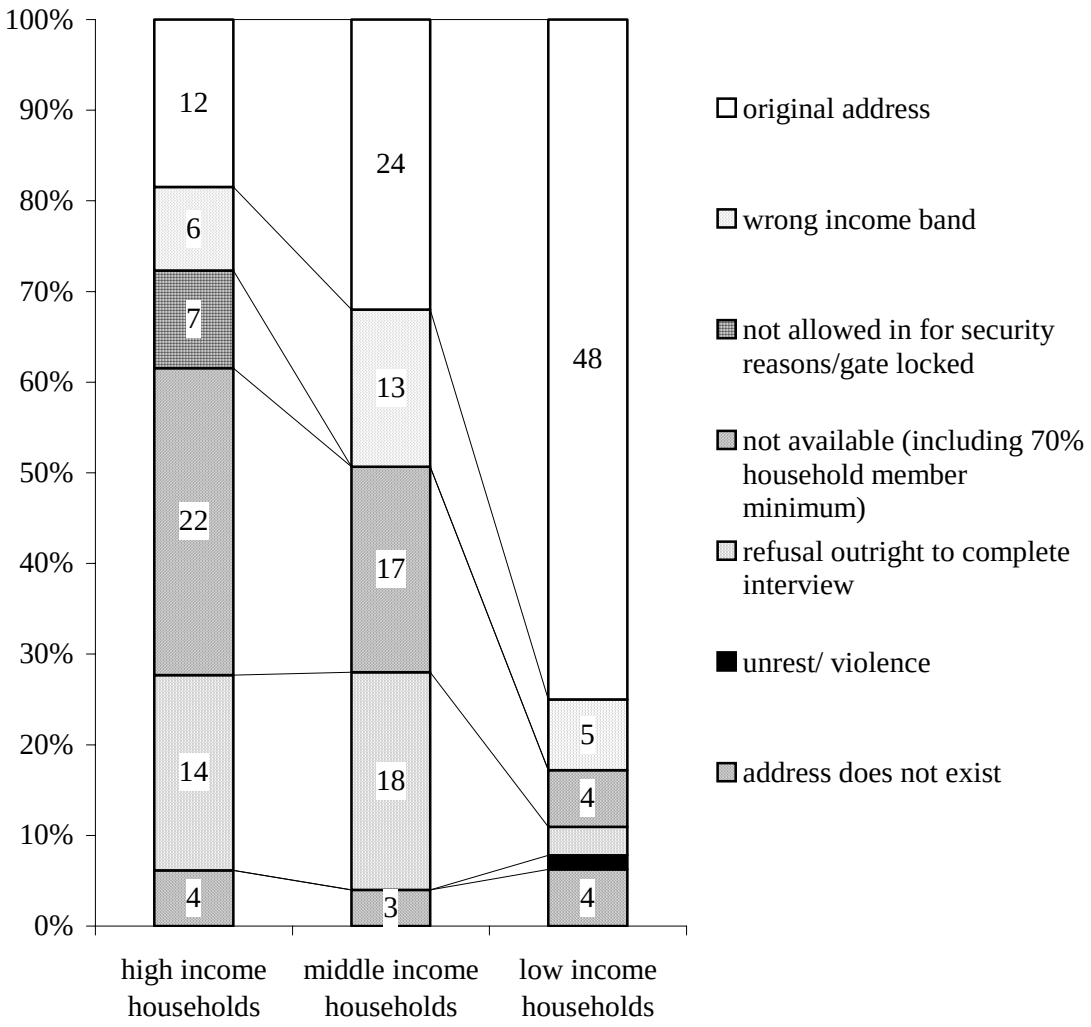

Figure 2. Reasons for household respondent substitution in a Cape Town activity diary survey by income band (Behrens 2002)

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 criminality rates are low compared to other sub-Saharan cities. Nevertheless, a feeling of insecurity was sometimes observed amongst interviewers (see below Interviewer bias).

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.[4] 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) also 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%).

To limit interviewer bias, composition of field groups in Western Africa surveys takes into account, among other factors, ethnical group and languages spoken by interviewer, his/her ethnical group and predominant languages and ethnical groups in surveyed areas. Particularly in areas where traditional Muslim populations are numerous, field groups include at least one female interviewer 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, professional interviewers adapted their way of dressing to the type of household: 'traditional' or 'modern'.

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[4] 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.

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 as dangerous, interviewers must indicate precisely to their supervisor the location of households where they will be administering the questionnaire. They are also recommended to leave the area early in the evening even if this is rather restricting as respondents are more easily available in the evenings. In Douala, interviewers asked organisers to work by groups of at least two in the same area so as to 'feel secure'.

'Conventional' 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 'conventional' 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 the Western Africa survey procedures strenuously 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 finally was not selected.

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.

In contexts where transport conditions are difficult, this factor must of course be taken into account in the organisation of fieldwork and its monitoring. To reduce the time and costs of transport, interviewers are assigned, if possible, to survey areas near their residential location. In other surveys, staff transport is organised, as was the case in Dakar for the most distant areas, in the city fringe.

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. As said before, back-checks are essential and experience in West Africa has shown that they must be done very strictly from the very beginning of surveys. In that way, mistakes in the comprehension of questions or in completing questionnaires may be detected rapidly and either the interviewer or supervisor improves his/her work or he/she is replaced. To do this, regular meetings of fieldworkers and survey organisers are scheduled from the start of the survey and fieldworkers bring the filled-in questionnaires as soon as possible to be checked. In Dakar, for instance, survey organisers did not anticipate such meetings and therefore back-checks with interviewers took place in the street, but obviously it was difficult. In Niamey, meetings with fieldworkers took place regularly and survey organisers were on duty at the meeting place at scheduled time slots everyday during the survey period. In Douala and Conakry, a similar procedure was adopted. However, the location of the meeting place is very important. In Conakry, the urban area

has a very elongated shape in the Southwest-Northeast direction and only two roads going from one end of the city to the other are served by public transport. Daily bottlenecks are obviously very frequent. The meeting place with fieldworkers was at the farthest South-western end of the city and therefore at rush hour fieldworkers could take up to three hours to arrive to the meeting place.

As cellular telephones are more frequent 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 should be considered in the survey budget.

5. Conclusion: Towards a research agenda for improving survey instruments and procedures

How then might the common problems experienced in West and Southern African passenger travel surveys identified in the preceding section, and summarised in table 2, be overcome? More specifically, what research agenda would be required to test and develop survey instruments and procedures able to address these problems and improve data quality?

Table 2. Summary of problems experienced in West and Southern African passenger travel surveys

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

The foregoing discussion illustrates clearly that it is imprudent in the West and Southern African context to undertake passenger travel surveys without careful analyses of the political and cultural milieu within which data are to be collected, and without thorough pilot- and pre-testing of survey instruments and their back-translation in the case of multi-lingual samples. The magnitude of the obstacles confronting reliable and instructive data collection in West and Southern African cities however suggests that 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 tentatively identify four arenas of necessary future exploratory research.

The first relates to the development of multi-modal methods of data collection suited to the context of 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. The former instruments would compensate for poor pre-existing databases by providing data with which later smaller samples can be designed, and if undertaken rather frequently, they would provide highly representative and reliable data on a limited number of key travel variables. 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.

The second research arena relates to the development of survey instruments that are easily understandable to poorly educated respondents with low levels of literacy and numeracy. Important in this regard would be cognitive testing of alternative ways of expressing concepts and terminology, and alternative ways of asking questions and collecting data in different types of survey 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 methods, and in so doing, address the earlier mentioned problems of instrument cognition, equivalence, concept familiarity and considering hypothetical alternatives.

The third research arena relates to exploring different ways of reducing unit and item non-response rates and associated sampling bias. What is envisaged here is a project in which the impact of survey length and question ordering on respondent burden and on item non-response and data quality is tested. Such a project would also need to test the impact that the provision of various types of incentives might have on rates of unit non-response.

A fourth research arena relates to the development of improved interviewer training methods, as a way of addressing the earlier mentioned problem of interviewer reliability and competence, as well as of enabling trained interviewers to deal better with the earlier mentioned problems of interviewer bias and invalid responses. Such a project might test the efficacy of alternative training methods, and could usefully produce a interviewer training field manual as an output.

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 derive their greatest benefit. The main problem confronting the acquisition of reliable and good quality data is the cost of this type of work 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 Niamey was research funding available for data collection with no associated specific operational objective. To derive greatest benefit from these infrequent and targetted 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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