

Review of Data Collection Methods for a Continuous Survey of Personal Travel

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Abstract:

Since 1971, the Transport Data Centre (TDC) has conducted personal travel surveys at ten-yearly intervals. Three major household travel surveys have been conducted to date: the 1971 Sydney Area Transportation Study (SATS) Home Interview Survey, the 1981 Sydney Region Travel Survey, and the 1991/92 Home Interview Survey (HIS). In recognition of the ongoing need for the most up-to-date data possible, TDC intends to replace these large-scale ten-yearly surveys with a continuous survey, the Household Travel Survey (HTS), commencing in 1997. To ensure that the most suitable collection method is used for the continuous survey, TDC conducted a review of collection methods from June to July 1996. The review tested three collection methods: face to face personal interview method, mail out/mail back method and drop off/mail back method. The review also tested the performance of two types of diary, travel diary and activity diary, in the collection of detailed 24-hour travel data. Both diaries were used in each of the collection methods tested. The review concluded that the face to face personal interview method using a travel diary is the most suitable method for the HTS as this method provided the highest response level, data quality, and range of data items for a similar level of cost as the alternative methods tested. This paper will discuss the methodology used to test various collection methods and the findings from the review.

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Introduction

In 1991/92 the Transport Data Centre (then the Transport Study Group NSW) of the NSW Department of Transport undertook the Home Interview Survey (HIS), a large scale survey of personal travel behaviour. The HIS was conducted using a 24-hour travel diary and a face to face interview collection method

Since 1992 a number of major surveys of travel behaviour have employed different travel diary formats and/or collection methods to those used in the HIS. For example,

- the Dallas-Fort Worth Household Survey, conducted by the North Central Texas Council of Governments, used an activity diary, and
- the Victorian Activities and Travel Survey (VAIS), an ongoing survey being conducted by the Transport Research Centre (TRC), uses a self-enumerated mail out/mail back collection method

Although the general advantages and disadvantages of alternative diary formats and collection methods were known to the Transport Data Centre (TDC), differences in survey aims, definitions, unit costs, design constraints, geography and time periods for previous studies meant that a direct comparison of each alternative was not available.

Accordingly, in 1996 TDC undertook a Review of Data Collection Methods to determine the relative merits of alternative collection methods and diary formats. The review tested two diary formats and three collection methods. The two diary formats tested were (i) the travel diary, and (ii) the activity diary. The three collection methods tested were (i) face to face interview, (ii) drop off/mail back, and (iii) mail out/mail back.

Diary types

There are two major diary types used to collect travel data: the *travel diary* and the *activity diary*. The term *travel diary* is used in this paper to describe diaries that focus directly on travel behaviour by asking questions of the form "where did you go next?". The term *activity diary* is used to describe diaries that focus on activities by asking questions of the form "what did you do next?". In an activity diary, travel is a special subset of all activities.

There has been some debate over the last few years as to whether travel data should be collected using travel diaries or activity diaries. Stopher (1992) suggested that activity diaries may provide better trip information than travel diaries, particularly in the enumeration of smaller trips that may not be recalled outside an activity framework. The results of subsequent studies have been equivocal. Ampt (1996) contrasts the higher trip rates reported by Stopher with the work of Kalfs and van der Waard (1994) where it is concluded that an activity diary does not necessarily produce more accurate trip enumeration. She also highlights conflicting evidence as to the relative ease of completion of activity and travel

diaries, with "Stopher (1992) reporting that activity diaries are easier, Kalfs and van der Waard (1994) the reverse and Grønmo and Harvey (1992) that there seems to be little difference between them".

Given the uncertainty as to the relative merits of travel and activity diaries, IDC decided to test both diary formats in the review.

Collection methods

Where lengthy and complex travel information is required from all members of a household, telephone surveys provide relatively low response rates. Therefore, IDC did not consider telephone retrieval as suitable for testing in the review. The two broad approaches considered were those known to best maximise response, the *face to face (or personal) interview* method, where an interviewer asks the questions, and the *self-enumerated* method, where respondents complete questionnaires themselves. It was decided to include the drop off/mail back method in the review to test whether the presence of an interviewer in dropping off questionnaires provided an advantage over the more common fully self-enumerated method of mail out/mail back.

Options

There were six options tested in the review:

	<i>Diary type</i>	<i>Collection method</i>	<i>Households sampled</i>
<i>Option 1</i>	Travel	Face to face interview	84
<i>Option 2</i>	Activity	Face to face interview	42
<i>Option 3</i>	Travel	Drop off/Mail back	91
<i>Option 4</i>	Activity	Drop off/Mail back	91
<i>Option 5</i>	Travel	Mail out/Mail back	120
<i>Option 6</i>	Activity	Mail out/Mail back	120

The sample sizes used in the review can be compared with the VAIS pilot study, where a sample size of 63 was used for each option (Ampt (1993)). IDC decided to use larger sample sizes than this for the review options to ensure that an adequate number of responses were received for analysis, even if low response levels were attained. The sample size for each option was the estimated sample required to achieve approximately 50 full response households. On this basis, the sample size for the option of face to face interview using an activity diary was originally 84, but, due to budgetary restrictions, it was necessary to reduce the sample for this option to 42. The option of face to face interview using an activity diary

was chosen for sample reduction because it was anticipated that for face to face interview the differences between an activity diary and a travel diary would be relatively minor, since the travel diary used a verbal activity recall framework to simulate an activity focus.

Diary design

Travel diaries

The travel diaries used in the review were very similar to designs used successfully in previous surveys. The diary for face to face interview was similar to that used in the 1991/92 HIS. The diary for drop off/mail back and mail out/mail back collection was similar to that used in VATS.

Activity diaries

The design of the activity diaries used in the review went through a number of stages. The original design was similar to the Dallas-Fort Worth Activity Diary, in which change of mode during travel is treated as a separate activity to the travel itself. TDC testing of this design revealed strong respondent resistance to the increased reporting burden that can arise from this approach. This increased burden is illustrated in the following table by comparing the number of activities or trips generated by using an activity or travel diary where a person walks from home to a station, catches a train, then walks to work.

<i>Activity/Trip no.</i>	<i>Activity diary</i>	<i>Travel diary</i>
	At home	At home
1	Travel (Walk)	Travel (Walk)
2	Activity (Wait for/get on vehicle)	Travel (Train)
3	Travel (Train)	Travel (Walk)
4	Activity (Leave/get off vehicle)	
5	Travel (Walk)	
6	Activity (Work)	

It can be seen that for this common travel pattern the activity diary required the respondent to report six activities, whereas a travel diary would only require the respondent to report three trips. This increased burden is clearly non-trivial, and it was therefore not surprising that IDC found strong respondent resistance to this design.

As a result of the negative response to the original activity diary design, a modified design was produced. A key modification was to reduce the number of activities generated by travel such as that in the current example, by treating the concepts of 'wait for' and 'get on/off' for public transport *not as separate activities to travel, but as details of the single activity 'travel'*

Testing of the modified design indicated that although the amount of information supplied by respondents using this design was not necessarily less than that supplied using the original design, it was generally *perceived* by respondents as a lesser burden because the number of activities was reduced, and it was more natural to regard 'wait for' and 'get on/off' as *attributes* of travel rather than separate activities. The table below shows how the example travel pattern would be recorded using the modified activity diary design.

<i>Activity/Trip No.</i>	<i>Activity diary</i>	<i>Travel diary</i>
	At home	At home
1	Travel (Walk)	Travel (Walk)
2	Travel (Train)	Travel (Train)
3	Travel (Walk)	Travel (Walk)
4	Activity (Work)	

Testing of the original design also revealed respondent resistance to regarding 'Pick-up someone or get picked-up' and 'Drop-off someone or get dropped-off' during a car trip as separate activities. The modified design therefore adopted the same approach as that used for public transport, with details of drop off/pick up being collected as attributes of car travel rather than as separate activities.

Although IDC found that the modified activity diary design, which retains an activity focus, but reduces the number of activities to be recorded, was preferred to the more purist activity diary design, it is important to make clear that no *definitive* claim is made here. Budgetary and time restraints for the review only allowed for sufficient formal testing to warrant the statement that the modified design is worth consideration by anyone intending to use an activity diary to collect travel data

Evaluation of options

Each option was evaluated in terms of the following broad categories (i) response, (ii) trip enumeration, (iii) data quality, (iv) range of data items, and (v) cost.

Response

Table 1 compares response rates for the six review options. The rates quoted are for net sample sizes (gross sample less vacant, demolished etc. dwellings) and without any refusal conversion. 'Fully responding household' is defined as a household where fully completed diaries are obtained from all members of the household.

Table 1: Comparison of response rates (fully responding households)

	Travel diary	Activity diary
Face to face method	45.2%	43.9%
Drop off/mail back	40.4%	49.4%
Mail out/mail back	40.7%	39.5%

The most notable result here is that the face to face method did *not* achieve the highest response rate overall, though it did for travel diaries. Even for travel diaries, however, the margin is relatively low.

This was a somewhat surprising result. One of the major benefits of the face to face interview has always been that it provides significantly higher response levels in household travel surveys. In the 1991/92 HIS a response level of 62% was achieved, significantly higher than the 45.2% achieved in the review.

The major factor affecting response for the face to face options in the review was almost certainly the comparatively limited training that could be given to interviewers. Although all six interviewers used were experienced interviewers, only two had any previous experience in conducting household travel surveys. In addition, the interviewer burden for the review was significantly higher than would be the case for an actual survey, as interviewers had to learn *both* the travel and activity diary formats, and a high proportion of training time concentrated on the differences between the two. It could be confidently expected that higher response levels would be achieved in an actual survey, where the diary format was predetermined and more comprehensive training on response maximisation could be provided.

Trip enumeration

Definition: Trips can be collected and/or analysed as either 'unlinked' or 'linked' trips. "Unlinked" trip databases include all stops in a trip as separate data items, e.g. walk to the bus stop, bus to the next bus stop, and walk to the destination would be recorded as three separate data records. **Linked** databases, on the other hand, include only one record for the above set of stops, i.e. a trip to the destination using the modes of bus and walk"

(Ampt (1993))

In order to have the flexibility to construct linked trips of different kinds it is necessary to collect data on an unlinked trip basis, even if the primary analytical focus is linked trips. Consequently, TDC household travel surveys always collect unlinked trips, and all references to trips throughout this paper refer to unlinked trips.

People reporting trips: Table 2 compares the proportion of people who reported trips for the six review options. This proportion provides an indication of the extent to which respondents accurately reported having made any trips at all on their travel day. A low proportion suggests that some respondents who did make trips on travel day reported no trips in order to avoid the completion of trip details.

Table 2: Proportion of people who reported trips

	Travel diary	Activity diary
Face to face method	93%	92%
Drop off/mail back	93%	81%
Mail out/mail back	82%	85%

The clearest result here is that the face to face method produces a consistently high proportion of respondents reporting trips compared to other collection methods. This is consistent with previous studies which have shown that the presence of an interviewer reduces the possibility of respondents incorrectly reporting no trips on their travel day.

The review results provided no clear evidence that there is any significant difference between the travel diary and the activity diary in the proportion of people who report trips.

Accurate reporting of last trip: Table 3 compares the proportion of travellers whose last trip was to home for the six review options. This proportion provides an indication of the respondents' understanding of the diary format, as the vast majority of last trips of the day are to home (in the 1991/92 HIS 96% of travellers recorded their last trip as being to home).

Table 3: Proportion of travellers whose last trip was to home

	Travel diary	Activity diary
Face to face method	88%	53%
Drop off/mail back	65%	44%
Mail out/mail back	76%	38%

These results show clearly that the activity diary format led to major problems with the collection of the last trip of the day. Examination of activity diaries where the last trip of the day was not to home indicated that respondents and interviewers misunderstood the diary format and failed to report their last trip as being to home.

In a full survey interviewers would be expected to overcome the problem of poor response to the last trip of the day by prompting respondents appropriately. However, for the drop off/mail back and mail out/mail back methods this would not be possible; in most cases it would be reasonable to impute the last trip as being to home, but other details of the trip could not be imputed. This is therefore a potentially serious defect in the use of a self-enumerated activity diary.

Comparing collection methods, the face to face method shows a significantly higher proportion of travellers whose last trip was to home. This is no doubt due to the ability of an interviewer to prompt the respondent to ensure the accurate reporting of the last trip of the day.

Fully completed trip details: Table 4 compares the proportion of trips that provided fully completed trip details (ie. no missing data items) for the six review options

Table 4: Proportion of trips with fully completed trip details

	Travel diary	Activity diary
Face to face method	94%	95%
Drop off/mail back	79%	92%
Mail out/mail back	69%	78%

Table 4 demonstrates clearly that the face to face method provides a significantly higher proportion of trips with fully completed trip details than the drop off/mail back and mail out/mail back methods. This is consistent with previous studies and undoubtedly due again to the ability of an interviewer to prompt the respondent to ensure the completion of all data items.

For the face to face method, the review showed no difference in the proportions for travel and activity diaries. However, for both the drop off/mail back and mail out/mail back methods, the activity diary showed a higher proportion of trips with fully completed details.

The reasons for the higher proportions for the activity diary in self-enumeration are not clear. The major difference in design between the travel and diary formats is in the sequencing or flow of the questions, rather than in any significant difference between question code frames. Therefore, no significant variation in the proportion of trips with fully completed trip details was expected. Subtle differences in page layout between the travel and activity diaries, particularly differences in colour usage, may have affected the item

response, but no firm conclusions can be drawn

Trip rates: Comparison of trip rates for the six review options was complicated by the fact that only the face to face method using a travel diary collected walk trips to and from car *directly*. The other options collected a separate item 'walk time from car', from which it was necessary to impute the number of walk trips to and from car.

Table 5a compares average trip rates per person for the six review options. The rates shown are for trips that were directly measured. Therefore, for all options other than face to face interview using a travel diary the rates exclude walk trips to and from car.

Table 5a: Average trips per person (direct measurement)

	Travel diary	Activity diary
Face to face method	4.6	4.7
Drop off/mail back	3.8	2.8
Mail out/mail back	3.7	3.3

It was then necessary to impute the number of walk trips to and from car for those options where it was not collected directly. The approach taken initially was adapted from that originally devised by Ampt (1993)

Where a time of two minutes or more was reported for the question "How long did it take to walk from the car to [your destination]?" a walk trip *from car* was imputed. It was assumed that, in the vast majority of cases, if walk time was two minutes or more then at least 100 metres would have been walked, 100 metres being the distance threshold used to define a trip using face to face interview. If a later trip involved use of the same car, a walk trip *to car* was also imputed (except for the face to face method using activity diary, as interviewers would have probed the respondent to report this trip directly).

Table 5b compares average trip rates per person for the six review options, with walk to and from car trips imputed using the method discussed above.

Table 5b: Average trips per person (including imputed walk trips)

	Travel diary	Activity diary
Face to face method	4.6	5.6
Drop off/mail back	4.9	4.6
Mail out/mail back	5.1	4.9

The trip rates shown in Table 5b indicate that the imputation approach based on walk time from car does not provide accurate data. The results obtained are contrary to all previous studies that show that self-enumerated methods do *not* obtain higher trip rates than the face to face method.

This imputation approach clearly leads to significant over-enumeration of walk trips to and from car. This conclusion is consistent with other studies viz

- In Ampt (1993), imputation increased the mode share for 'Walk' from 20% to 33%, whereas an imputed figure closer to 25% was expected. Imputation also significantly changed the distribution of trip purposes, leading to the conclusion that "the difference in trip rates between self-completion and personal interviews has still not been resolved satisfactorily".
- Data from face to face surveys indicates that the proportion of trips that is walk to and from car (100 metres or more) is much smaller than that derived from the imputation approach. This is illustrated in Table 5c.

Table 5c: Walk to and from car (Source: 1991/92 HIS)

A. Trips/Person where walk to and from car is excluded	4.76
B. Trips/Person	5.10
Ratio B/A	1.07

As can be seen from the HIS data, adding walk trips to and from car only increases trip rates by 7%, a much smaller figure than the 30% or more increases obtained using the imputation approach

In view of the obvious problems using the imputation approach, it was decided for the review that the most accurate estimate for trip rates would be obtained by simply applying the ratio shown above. This provides the final trip rates for the review options shown in Table 5d.

Table 5d: Average trips per person (including *estimated* walk trips)

	Travel diary	Activity diary
Face to face method	4.6	5.0
Drop off/mail back	4.1	3.0
Mail out/mail back	3.9	3.5

For both the drop off/mail back and mail out/mail back methods, the travel diary obtained

substantially higher trip rates than the activity diary. It is difficult to say how much of this difference is due to a genuine superiority of the travel diary over the activity diary, as the specific activity diary used in the review may not be optimal, and it is possible that with further refinement a format that elicited higher trip rates might be achievable. However, the differences in trip rates in favour of the travel diary are big enough to at least warrant the conclusion that *for self-enumeration, there is unlikely to be any significant improvement in trip enumeration by using an activity diary rather than a travel diary.*

For face to face interview the activity diary obtained a higher trip rate than the travel diary. This result was puzzling as it had been expected that the difference in trip rates between travel and activity diaries for face to face interview would be trivial. If a travel diary is administered by an interviewer it allows the use of a *verbal activity recall framework* where an activity focus can be simulated by asking "What did you do next?", and hence the trip rates obtained should be very close to those obtained from an activity diary.

It can be seen from Table 5e that the higher trip rate for the activity diary in face to face interview can be accounted for by the higher trip rate for car usage. In fact, where the overall trip rate is 0.4 higher for the activity diary, it is 0.8 higher for car usage.

Table 5e: Average number of car trips per person

	Travel diary	Activity diary
Face to face method	2.8	3.6
Drop off/mail back	2.2	2.2
Mail out/mail back	2.8	2.4

This is an exceptionally high difference in car usage between the travel and activity diary, as car trips are the least likely to be underenumerated whatever diary format is used. It is suggested that the activity diary sample included unusual travel behaviour that biased the results, and examination of the samples established that this was the case. It was found that the higher trip rates for the activity diary were due to bias arising from the chance selection of three or four households with unrepresentatively high car usage. In view of this bias in the activity diary sample for face to face interview, no conclusion can be drawn in terms of trip rates as to the relative merits of a travel diary and activity diary when used in face to face interview.

The following main conclusions regarding trip rates can be drawn from the review:

- For both the travel diary and activity diary the review showed higher trip rates for the face to face interview method than self-enumerated methods. However, given the uncertainty of comparing reported and imputed walk trips, and bias in the sample for face to face interview using an activity diary, no definitive conclusion can be drawn from the review regarding trip rates for alternative collection methods.

- There was *no* evidence that an activity diary produces higher trip rates than a travel diary when used with self-enumerated methods

Respondent preference

During the validation phase, respondents were asked to compare the diary format they had completed with the alternative diary format. Two thirds of the travel diary respondents said they preferred the travel diary, whereas only one third of the activity diary respondents said they preferred the activity diary. For respondents expressing a preference for the travel diary, the main reasons given were that the travel diary was shorter, easier to understand and didn't ask for information that wasn't directly related to travel. Interviewers were also asked their opinion of the two diary formats, and four out of the six interviewers preferred the travel diary format for face to face interviewing.

On the basis of this qualitative evidence, it can be stated that *for self-enumeration, there is unlikely to be any significant respondent preference for an activity diary over a travel diary.*

Cost per responding household

Comparing costs for each option is not a straight-forward process as different assumptions need to be made for each option, and judgements have to be made about likely economies of scale in a full survey. In addition, the actual amounts quoted are based on response levels and market research rates in Sydney at the time of the review, and may vary significantly for similar surveys conducted at different places and times. *The costs quoted, therefore, are presented largely to help quantify the relative, not absolute, differences between the options.* Marginal cost estimates only are shown, as design, management, overhead and other fixed costs would be broadly comparable for each option.

Table 6a shows the estimated base marginal cost for each review option. This base cost excludes querying and validation, and allows for only minimal editing i.e. it is the cost for basic collection and processing of data.

Table 6a: Estimated base marginal cost per responding household

	Travel diary	Activity diary
Face to face method	\$139	\$149
Drop off/mail back	\$116	\$123
Mail out/mail back	\$95	\$121

It can be seen from this table that the *base costs* for self-enumerated methods are clearly less expensive than the face to face method. However, caution is necessary when interpreting base costs as the *quality* of data at this stage is very different for the self-enumerated and face to face methods. Self-enumerated data, as reported, is generally of a much lower quality than that obtained with the assistance of an interviewer. Therefore, to compare costs more accurately it is necessary to estimate the additional costs involved to bring the quality of data for self-enumerated methods up to that of face to face interview.

Table 6b shows a marginal cost estimate for each review option, taking into account the amount of intensive editing, querying and validation that is necessary to bring the quality of data for self-enumerated methods up to that of face to face interview; the major additional cost is for 20% validation using the face to face collection method. For the purposes of the review, where as much as possible *direct* comparisons were required, no imputation of missing trips or data items was allowed. Such imputation can reduce costs, but does not allow for reliable quantification of differences in quality.

Table 6b: Estimated marginal cost per household

	Travel diary	Activity diary
Face to face method	\$139	\$149
Drop off/mail back	\$147	\$158
Mail out/mail back	\$139	\$168

Comparison of Table 6a and Table 6b demonstrates the significant extra cost required to raise the quality and reliability of data obtained using self-enumerated methods to the level obtained using face to face interview. It should be noted that these extra costs are calculated on the assumption that no imputation of missing data is undertaken to raise the quality of self-enumerated methods.

Based on these costs, the following conclusions can be made:

- When the full costs of ensuring data obtained using self-enumerated methods are to the same standard as data obtained using face to face interview are taken into account, *there may be no significant difference in marginal costs between face to face and self-enumerated methods.*
- *The activity diary format is more expensive than the travel diary format for all collection methods.* For the drop off/mail back and mail out/mail back methods, this is mainly due to extra printing and/or mail expenses for the activity diaries, which have to contain, by definition, more pages than travel diaries. For the face to face method, the additional cost for the activity diaries is largely due to the additional interviewer time required to collect activity as well as trip data.

Range of data items

Both the drop off/mail back and mail out/mail back methods use a self-enumerated travel diary. It is generally agreed that for a self-enumerated travel diary it is essential to minimise respondent burden by restricting the information collected for each trip to one page. This 'one trip - one page' restriction means that there are physical design limits to the number of questions that can be asked using a self-enumerated travel diary.

The face to face method does not have the 'one trip - one page' limitation because the presence of an interviewer reduces respondent burden in interpreting and answering diary questions. Therefore, for the face to face method it is quite feasible to have an extra page of questions for each trip, and hence a significant number of extra data items can be collected using this method.

Conclusions

Choice of a collection method

The relative merits of face to face interview and self-enumerated methods for the collection of travel data are well established, and the findings of the review were essentially consistent with previous studies. The choice between face to face interview and self-enumerated collection methods rests largely on two criteria (i) the level of response and quality that is affordable, and (ii) the number and complexity of data items that is required.

The level of response and quality that is affordable: The results of the review confirm previous studies that the quality of data obtained using face to face interview is significantly higher than that obtained using self-enumerated methods. The collection method that is most suitable for a particular survey will in large measure depend on the level of quality that is acceptable to users of the data.

If users are prepared to accept a relatively low level of data quality (or, to put it another way, accept a significantly high level of estimated or imputed data), then self-enumerated collection methods are likely to be less expensive than the face to face interview option. However, if a higher level of data quality is required from self-enumeration, then the cost of this method will increase quickly. On the basis of the review results, if a level of data quality equivalent to face to face interview is required from self-enumeration then the cost of a self-enumerated method can be close to that of face to face interview.

The number and complexity of data items that is required: For self-enumerated collection methods the design of questionnaires is restricted by the need to minimise respondent burden by limiting the collection of information for each trip/activity to one page. If a large number, or a complex set, of questions is required per trip/activity there is little recourse other than to use the face to face interview method.

Choice of a diary format

The choice of a diary format for the collection of travel data is not informed by the same weight and consistency of studies as the choice of a collection method. Studies to date have led to equivocal outcomes, and the current review also had its share of mildly perplexing results. However, the overall findings from the review were sufficiently clear to state that *there was no evidence that an activity diary is superior to a travel diary for the collection of travel data*. In view of this conclusion, and the fact that an activity diary is almost inevitably more expensive than an equivalent travel diary, the review supports "the silent majority which continues to make use of existing travel data, finds this data suitable for current needs, and is not convinced of the merits of an alternative" Ampt (1996)

Although the amount of respondent feedback in the review was not high enough to allow for quantification of the reasons for the failure of the activity diaries to improve on the performance of the travel diaries, enough feedback was received to allow for some informed conjecture. Ultimately, it is respondent *perception* of the activity diary format that determines its suitability. The following features of the activity design are likely to have an impact on this perception:

Increased respondent burden: By definition, a person has more activities than trips during a day, and therefore has to complete more pages in an activity diary than in a travel diary. In the absence of any general agreement that there is a compensatory reduction of this burden through some other feature of the activity diary, it is reasonable to conclude that the overall respondent burden is higher for an activity diary than a travel diary. Given this increased respondent burden, there may well be a bias towards trip *underenumeration* in the use of an activity diary. That is, *even if it is true that respondents remember more trips through an activity focus, it does not necessarily follow that they report more trips*. Their enhanced recall may be offset by a reduced willingness to cooperate, and hence a tendency to 'forget' trips.

Greater potential for concerns about security, confidentiality, 'intrusiveness': Because an activity diary focuses on activities it is more readily interpreted by the respondent as intrusive, and hence there is a greater likelihood of either (i) refusal to complete the diary, or (ii) conscious omission of certain activities. Although in a travel diary activities are derivable from the purpose of the trip, the indirect nature of activity collection makes it less likely that the respondent will perceive the questions as intrusive.

Inconsistent design: Using an activity diary to collect trip data produces an unstable design. To ensure respondents focus on activities, the survey instruments need to convey an impression that activities are the primary concern. However, because trips are actually the primary concern, the weight of data items is trip-related; we commonly ask for details of vehicle usage, parking availability, ticket types and fares, but rarely any details of non-travel activities. This inconsistency of focus could lead some respondents to regard the survey design as 'dishonest' or 'tricksy'. The travel diary avoids this possibility; it is explicitly,

directly and simply about travel.

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