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TRAVEL SURVEY DATA REQUIRED TO INFORM TRANSPORT SAFETY POLICY AND PRACTICE

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Abstract

The risk of accidental death per hour spent using the roads in Hong Kong is about 11 times the average risk per hour in the rest of everyday life. Other kinds of travel also have risks. Changes in travel patterns affect the numbers of people killed and injured in transport accidents. This means that all policies that affect travel patterns also affect the numbers killed and injured in transport accidents, and conversely, changing travel patterns may itself be a way of reducing these numbers. Investigation of these interactions between travel patterns and amount of death and injury in transport accidents can benefit greatly from various kinds of data that are already commonly collected in travel surveys. But the range of such investigations could be extended in useful ways if some additional items of data could be collected in travel surveys. There is also scope for the methods used in travel surveys to be extended in new ways to improve understanding of the occurrence of transport accidents and people's involvement in them by supplementing with surveys akin to travel surveys the data that are recorded when accidents occur.

1 Background

Travel using the roads is one of the main sources of risk of accidental death or injury in modern life. For example, surveys of people's use of time in Hong Kong (Chung 2003, Transport Department 1993) indicate that for every waking hour spent using the roads, about 33 waking hours are spent in other ways, whereas statistics of accidental death (Census and Statistics Department 2001, Transport Department 2002) show about 3 accidental deaths from other causes for each one on the roads. It follows that even if all the other accidental deaths occurred in the course of everyday life, the risk of accidental death per hour spent using the roads in Hong Kong is about 11 times the average risk per hour in the rest of everyday life. To the extent that some of the other accidental deaths occur among small minorities engaging in exceptionally risky occupations or pastimes, the figure of 11 is an underestimate. Other kinds of travel also have risks, but their contributions to the total numbers of people killed and injured are an order of magnitude smaller than that of travel by road.

This overall ratio of risk per hour spent, taken together with the knowledge that risks in using the roads can be reduced substantially by cost-effective methods that are broadly acceptable to the public, is a powerful indicator that greater priority should be given (Allsop 2003) to development and implementation of road safety strategies that engage and motivate all of the many stakeholders who can contribute to reducing death and injury on the roads. In the case of driving in the course of work, for example lorry-driving (Allsop 2005), the risks per hour spent driving – risk to the drivers and their workmates, and risk to third parties – are indicators of the importance of safety while driving in the course of work relative to other aspects of health and safety at work. But addressing these and other issues of transport safety

in specific practical ways, including changing how people choose to travel, requires much more situation-specific estimates of risk. This is where travel survey data, and the techniques used to collect and analyse it, have a part to play.

Changes in the way people choose to travel affect the numbers of people killed and injured in transport accidents. This means that all policies that affect travel patterns also affect the numbers killed and injured in transport accidents, and conversely, changing people's choices about travel may itself be a way of reducing these numbers. The fact that reducing risk in travel is one of the concerns of transport policy therefore leads to investigation of interactions between travel patterns and the amount of death and injury in transport accidents being one of the uses of travel survey data.

The first step in quantifying the effects of such interactions is to define *death* or *injury rates* as ratios of the form:

(number of people killed or injured)/(corresponding amount of exposure to risk)

where exposure to risk is defined in a way that is appropriate to the source of risk that is being quantified. Some common examples of measures of exposure to risk are:

- person-journeys
- person-hours spent travelling
- person-km travelled
- vehicle-km driven
- person-crossings of roads
- vehicle-entries to road junctions
- person- or aircraft-takeoffs and landings

The first of these can be seen as the most fundamental, because the journey is the unit of satisfaction of the need or desire to travel, and hence the fulfilment of the purpose of the journey as a contribution to the traveller's quality of life. But in order to quantify the risk per person-journey, it is in practice necessary to separate the journey into *stages* made by different means of transport, and sometimes to divide these stages into *elements* according to the conditions of travel (such as driving along different kinds of road) or particular events occurring during the stage (such as crossing a road while walking, or taking off in an aircraft). The risk associated with these stages or elements can then be quantified using measures of exposure like the others in the above list. The risk incurred in making a journey is the sum of the risks incurred in its different stages and their elements.

In practice, considerable aggregation of travel by large numbers of individuals is required in order to obtain meaningful estimates of death and injury rates, having regard also to the form in which information can be had about those killed and injured and the circumstances of their accidents. In assessing the risk associated with any pattern of travel, however, it is nevertheless important to disaggregate the travel appropriately by person-type and by the stages and elements of the journeys that it comprises in order to apply the resulting estimated rates sensibly,

In these processes, data from traffic counts and travel surveys have complementary roles to play in estimating measures of exposure. Broadly speaking, traffic counts can provide measures of travel by different means of transport and in different circumstances, but with at most limited distinction between type of person or type of journey. It is travel surveys that

provide information about the kinds of people who are counted, or the users of vehicles that are counted, in traffic counts, and about the kinds of journeys they are making.

2 Current roles of travel survey data in estimating risks of travel

There are by now in a range of countries extensive travel survey datasets recording the patterns of travel of members of representative households from cities, cities and their hinterlands, regions and whole countries. Some of these datasets provide time-series data over periods of up to four decades.

They record journeys made by household members according to person, time of day and week, and in some cases time of year, with the journeys broken into stages by change of means of transport and sometimes change of vehicle within a particular means of transport. Distances travelled and times taken are recorded. The reliability of such data and techniques for interpreting it correctly in the light of possible misrecording are the subject of an extensive and growing literature.

With the help of such data it is possible in principle to estimate:

- distance walked and time spent walking
- distance cycled independently of traffic counts, and time spent cycling
- distance driven in different kinds of vehicle independently of traffic counts, and time spent driving
- distance travelled and time spent travelling as passengers in private vehicles and taxis
- distance travelled (independently of operator patronage data) and time spent travelling by various forms of public transport
- how journeys are made up (by distance or time) of walking and use of different types of vehicle
- how all these distances and times are distributed according to age and gender of traveller and purpose of journey

The extent to which such estimates from any particular dataset are sufficiently reliable to be useful in practice depends on the size and characteristics of the sample concerned and just how information about the respondents' journeys was recorded. But even the most basic of the estimates in this list can add substantially to the information available from other sources, mainly traffic counts, about exposure to risk.

3 Possible augmentation of travel survey data for use in estimating risk

Two important ways in which further disaggregation of journey stages would be helpful in estimating risk are in respect of circumstances of walking and of driving.

For stages walked it would be useful to know the proportions of walking which take place

- away from vehicular traffic
- alongside vehicular traffic but physically separated from it
- immediately alongside vehicular traffic

and to know how many roads of different kinds are crossed and at what kinds of location (such as at or away from junctions and pedestrian crossings)

For stages driven it would be useful to know the proportions driven on different kinds of road.

These disaggregations present challenges in the framing of questions and formats of recording and in the stimulation and checking of recall by respondents, but they are important because risk differs so greatly among the circumstances concerned, and because risk during walking is so strongly associated with the element of crossing the road.

It would, of course, hardly be practicable, consistently with the other purposes of travel surveys, to seek such detailed information for all stages reported as being walked or driven. The issue is rather whether travel surveys can be used as the means of collecting such information for some tractable but still adequate subset of stages walked or driven, or, if this is impracticable, how the experience gained in the conduct of travel surveys can be used to design separate surveys to obtain this information.

4 Scope for household surveys to augment data about accident involvement

Accidents in wholly managed parts of the transport system – on railways, in commercial transport by air or water, and in public passenger transport on the roads – are systematically recorded in ways which, at least in the most developed societies, are largely comprehensive in coverage of incidents and extensive in coverage of information about them. This means that numbers of people killed or injured in such accidents can be regarded as known.

Accidents on the roads, other than those involving buses, coaches or light rail vehicles, are a different matter. Countries differ in the extent of legal requirement to report such accidents to the police or other authorities, and populations differ in their compliance with such requirements and in their inclination to report accidents where reporting is not a requirement. People also differ in what they regard as an accident that needs to be reported, and systems of recording of accidents that are reported differ in their coverage of information about the reported accidents. Coverage of accidents involving motor vehicles which happen in public places other than the roads, for example in car parks, is variable, as is that of people falling from or being struck by bicycles when no motor vehicle is involved. Pedestrians who fall and are injured when making journeys on foot may not be recorded as victims of transport accidents at all.

The upshot of all this is that although most well-developed societies record accidental deaths on the roads more or less comprehensively, those injured while using the roads, including some categories of those seriously injured, are substantially underrecorded. This means that further information is needed to estimate satisfactorily not only the denominators of death or injury rates, but also their numerators.

One way in which this could be addressed is by analogy with the estimation of occurrence of crime in some societies, where records of reported crime kept by the police are complemented by regular representative sample surveys of experience of crime by the population, such as the British Crime Survey (Dodd *et al* 2004). Similarly, current records of reported accidents on the roads could be complemented by undertaking regular surveys of representative samples of households, asking for information about accidents they have been involved in on the roads and the resulting injury to members of the household.

For the purpose of estimating correction factors for the numbers of injured people recorded in conventional road accident statistics, and estimating numbers of injured people, such as falling pedestrians, who are outside the scope of these statistics, only quite simple recall of accidents, perhaps over the preceding month or quarter, would be required, together with basic information about those injured, like age-group, gender and their use of the road at the time (as driver, passenger, cyclist, pedestrian etc), and whether anyone from another household was involved. The last item would be needed to enable the numbers of incidents to be estimated correctly. It would be for consideration to what extent other easy-to-recall circumstances of the accident could be ascertained. Development of the necessary survey methodology and estimation of required sample sizes, and hence of the annual cost of data collection and analysis, would require a programme of pilot studies, but it is relevant to note that the British Crime Survey is carried out on an annual cycle with 40 000 people aged 16 or over interviewed each year.

The extensive expertise that has grown up in the field of travel surveys and the interpretation of data gathered in them should be able to contribute strongly to the successful development and implementation of such surveys of accident involvement, and hence to the more adequate estimation of the numerators of death and injury rates.

5 References

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