

CHAPTER 6: ANALYSIS OF TIME-USE DATA

In order to work with time use data, users should consider the nature of the data which diaries collect and also the population which is sampled. We begin this chapter by outlining key elements of time use data. We then offer some basic tips for working with diary data.

6.1 The data which time diaries collect

Time diaries collect stories. Even when presented in the quantitative data format, the diary row still represents a story and can be read as a story. Users should keep this narrative element of time use data in mind when working with the MTUS or any other time diary dataset.

The elements of a quantitative diary are not mutually exclusive but overlapping domains. In most cases, the domains in a diary are separate. Knowing that a person was reading does not cover the whole picture, as there are many qualitative differences between reading while on the beach but also keeping an eye on the children, reading alone in the house while drinking a glass of wine and listening to music, and reading while standing on crowded public transport at rush hour. Nonetheless, there are some cases where the domains overlap. Taking the train to work is simultaneously a location, a mode of transport and an activity. Washing and changing a baby is an activity, but also an activity in which the presence of the baby is a necessary element, and hence this activity also indicates that a child was present.

A second dimension of the narrative quality of diary data that users should keep in mind is that the ordering of elements reported in the diary is not always the motivator of the next element of behaviour in a diary sequence. This fact can be obscured as the first column diarists typically are asked to fill in when accounting for their day is called “main” or “primary” activity. Diary instructions generally distinguish main activity from simultaneous activities people are doing at the same time. Nonetheless, the record in the main activity column is not always the dimension of an episode which is the most important to the diarist. The main activity may be eating, but the most important element of the activity for the diarist might be that her children or the person he has wanted to date for months is joining the diarist during the meal.

A third key dimension of the narrative element of diary data is that accounts are mediated the participants. Diarists do not report activities they consider irrelevant, risky, shameful or compromising. Participants also report those activities which they notice and consider of sufficient importance to report. Some activities, such as violence and illegal behaviour, seldom appear, and diarists in some cultures report sexual behaviour, while others do not. People focussed on a particular activity (such as caring for an adult, or an intensive day on the job) may forget to report an essential activity like eating if they periodically fit the behaviour into short sessions of browsing food in between other intensive activity. The absence of a report does not mean that people did not undertake a particular activity. Likewise, absence of particular reports in and of themselves reveal what populations consider to be unimportant or not fit for public discussion.

Time diaries sample sequences of activities. Many constraints influence our patterns of behaviour. The weather, our general health, how energetic we feel at any given moment, where we are in relation to resources and facilities, the money and time we have to spend at any particular point, social expectations, the basic needs of our bodies, requirements of our care or paid work responsibilities are among the many constraints which limit the range of patterns of actions in which each individual might engage on any particular day. One way to measure patterns of daily activity involves following particular individuals over time and collect a rich and detailed dataset about their behaviour (though the expense of such collection means that the sample necessarily must be small). Such a strategy will reveal what a particular person typically does at a particular stage in that person's life. Alternatively, a researcher can collect snapshots over a day or small number of days for a large number of people to get a sense of what patterns of behaviour occur across the population. The time-diary data included in the MTUS is of the latter variety. Large-scale diary surveys reveal what patterns of behaviour most regularly occur across a population and which groups of people are most likely to engage in different forms of behaviour. Large-sample diary surveys do not reveal the full range of activities of any specific participant, but do reveal what people with similar characteristics to any given diarist are more likely to be doing on different days and at different times.

A related consequence is that time diary surveys do not produce normal distributions for all activities. People only can do so much in one day, and no one can do every activity they normally undertake on any single day. Some researchers unfamiliar with time diary data have over-used Tobit models on the grounds that large numbers of 0-time cases appear for most activities. Nevertheless, MTUS users should keep in mind that Tobit models assume that large numbers of 0 cases appear because of censorship of reporting imposed by the survey design. In some limited cases, 0s for some activities may represent censoring, but in general, the 0s represent real behaviour – people cannot do

everything every day. For most time use diary analysis, users will need models which allow for real 0s in sequences of activities which occur over 24-hours.

Diaries will not reveal the full range of patterns of any given individual over longer periods. The unit of analysis is the sequence of activities or the summary time of activities for groups over 24-hours. For those activities which people undertake virtually every day (the domains noted elsewhere which we use as one dimension of distinguishing good-quality from low-quality diaries), we expect to observe at least one of the regular patterns of engagement in rest/sleep, eating or drinking, personal care and exercise or travel. For activities in which people generally engage on a less-than-daily basis, the diary data will reveal what people who undertake the activity do on days when they engage in the activity, but the diary data alone do not reveal whether any particular person ever undertakes the activity. To obtain this information, the survey designers would have to add supplementary questions to the diary asking participants if they ever undertake a particular activity, and if they do, how often they typically engage in that activity). While diary data can reveal which groups of people are most likely to take up an activity, diary data do not reveal total participation rates of activities people generally do not perform every day.

6.2 Basic analysis

People new to time use research should keep in mind a number of basic principles about working with this data. First, time is a rare commodity in that it is one of the few concepts we use on a daily basis but measure in units of 60 rather than in metric units. When modelling time, researchers use continuous measures such as of total minutes per day or week, participation rates, or the likelihood of categories of people engaging in a particular sequence of behaviours or not participating in such activities. When the final analysis produces figures in minutes (per day or per week), though, if the number of minutes involved is large, researchers are wise to report the findings in weeks, hours and minutes rather than just in minutes. Reporting that a group sleeps an average of 475 minutes on weekdays but an average of 525 minutes on weekends does not present the information in a meaningful way to most readers. Reporting that a group sleeps an average of 7 hours and 55 minutes on weekdays but an average of 8 hours and 45 minutes on weekends is meaningful to a wider audience. The Centre for Time Use Research maintains [a minutes to weeks, hours and minutes calculator](#) on its web site to facilitate such more meaningful reporting.

When time use researchers initially investigate data, they tend to produce three parallel sets of statistics:

- Average time spent in the activity over a 24-hour day of the whole population (total mean);
- Average time spent in the activity over a 24-hour day by those persons who undertook the activity on their diary day (participation mean);
- The proportion of the population who undertook the activity on their diary day (participation rate).

All three statistics have significant value. Knowing that people in a particular country work significantly fewer hours on night shifts over a 15 year period can mean multiple things. It might mean that fewer people work nights, but those who work nights continue to work similar shifts. It equally might mean that significantly fewer people work nights, but those who work nights work longer shifts. It also might mean that more people work nights but that they work shorter night shifts than in the past. To get a rounded picture, a researcher should calculate all three of these figures for basic analysis.

Time use collects general information. Concepts often can overlap, and many activities could fit into several different topics of analysis. If a researcher is interested in time that parents spend with children, passive supervisory care, playing active sports with children, helping with homework and showing children how to do things, physical and medical care, time escorting or travelling with children, and time when children are present but parents and their children are not interacting are all relevant. If the researcher is interested in travel to work, recorded commuting is relevant, but so is travel taking a child to school or day care before then travelling to the office, or walking a dog from the home to the office where the diarist records pet care as primary activity also are relevant to understanding how people get to work. If the researcher is interested in measuring the total physical activity of the population, sport and exercise are relevant, but so too are time travelling by physically active means (including walking and cycling), time playing outside with children (often coded in child care activity ranges), and time in active care or physically active housework. These examples demonstrate that an activity like walking a child to day care can fit into the concept of child care, commuting or exercise. Researchers need to approach analysis by considering the total range of areas in the diary in which a person might record an activity of interest to that concept.

Similarly, the meaning of a sequence of activity likewise can vary by the nature of the concept the researcher investigates. In some cases, a sequence may include the presence of other activities outside the main domain of interest. If the researcher wishes to record the degree to which paid work impacts work-life balance, an episode of paid work may include time that is not spent working (taking a break, doing personal or household activities on the computer while at work, as examples). Similarly, if the researcher wishes to profile how having children impacts on parent's time use, time when the child is not present (such as waiting for a child to come out of school or working on paperwork for the child

when the child is not present) would count as an episode of interest, and the episode would continue once the child arrives. In other cases, a change of activity out of a domain of interest would constitute an end of an episode. If the researcher is measuring total exercise time, time when a person stops physical activity to take a drink or meal break would not count as a continuation of the exercise episode. If the researcher is interested in time when children learn verbal language skills from their parents, time when the parents and children are not interacting does not count as the continuation of an episode. Researchers need to think about what constitutes a string of relevant information when deciding how they plan to use the time diary data.