

## Travel surveys by telephone: instructions for use

In "standard Certu" travel surveys, the way of interviewing people - face-to-face or by telephone - is imposed. In urban environments, why not carry out household travel surveys by telephone? Why not use only the telephone directory to draw out the interview sample? These are two questions often related to costs and convenience. The large amount of information to be collected in household travel surveys makes telephone interviewing difficult. In addition, the fact that not everyone is in the directory introduces a bias in mobility measurement. Those who are not in the directory move around more, but less by car, than the average. Car travel is therefore likely to be overestimated, and walking and public transport underestimated.

Certu has developed survey methods to record travel of people in urban environments or around urban areas. The various stages of these state-subsidised surveys are described in detail. In particular, the means of interviewing - face-to-face or by telephone - is imposed for each survey according to precise criteria, as well as the way of drawing out the sample. In statistics, errors exist due to the fact that not everyone is interviewed, but only a sample; these errors must be as small as possible. These errors, cal-

led sampling errors, result mainly from imperfections in the survey sample file : too old, not exhaustive enough or with duplicate entries, for example. The universal phone book is an easily accessible file. It is frequently updated and can be used to draw out a sample. But its main failing is its lack of exhaustiveness. This has an impact on the representativeness of the results. These must therefore be evaluated and ways found to cure the problem.

### People who do not subscribe to a land line: a population on the increase

"Standard Certu" household travel surveys (EMD) are carried out in face-to-face interviews; medium-sized town travel surveys (EDVM) and large area travel surveys (EDGT) are made by telephone. The reason that EMDs are performed face-to-face was initially because the questionnaire could not be managed by telephone because of its size due to the wealth of information to be collected. In addition, the telephone subscriber file is not used as such as a basis for sur-

veys in dense urban areas, because it is not complete, leading to a bias in the results. In the most recent surveys, people who do not subscribe to a land line account for more than 20% of households and the trend is for this to increase. As an example, in the Lille urban community<sup>(1)</sup>, the proportion of households that do not subscribe to a land line went from 6% in 1998 to 22% in 2006. And in certain central districts of the city, this proportion is greater than 40%.

**Arcep:** French authority regulating electronic communications and post offices

**DGI:** French tax department

**EDVM:** Medium-sized town travel survey

**EMD:** Household travel survey

**Insee:** French national institute for statistics and economic studies

**PTU:** Urban transport area



(1) The towns and cities mentioned were chosen from the most recent surveys for which the data are statistically significant, given the size of the corresponding samples. For clarity, the number of examples has been limited.

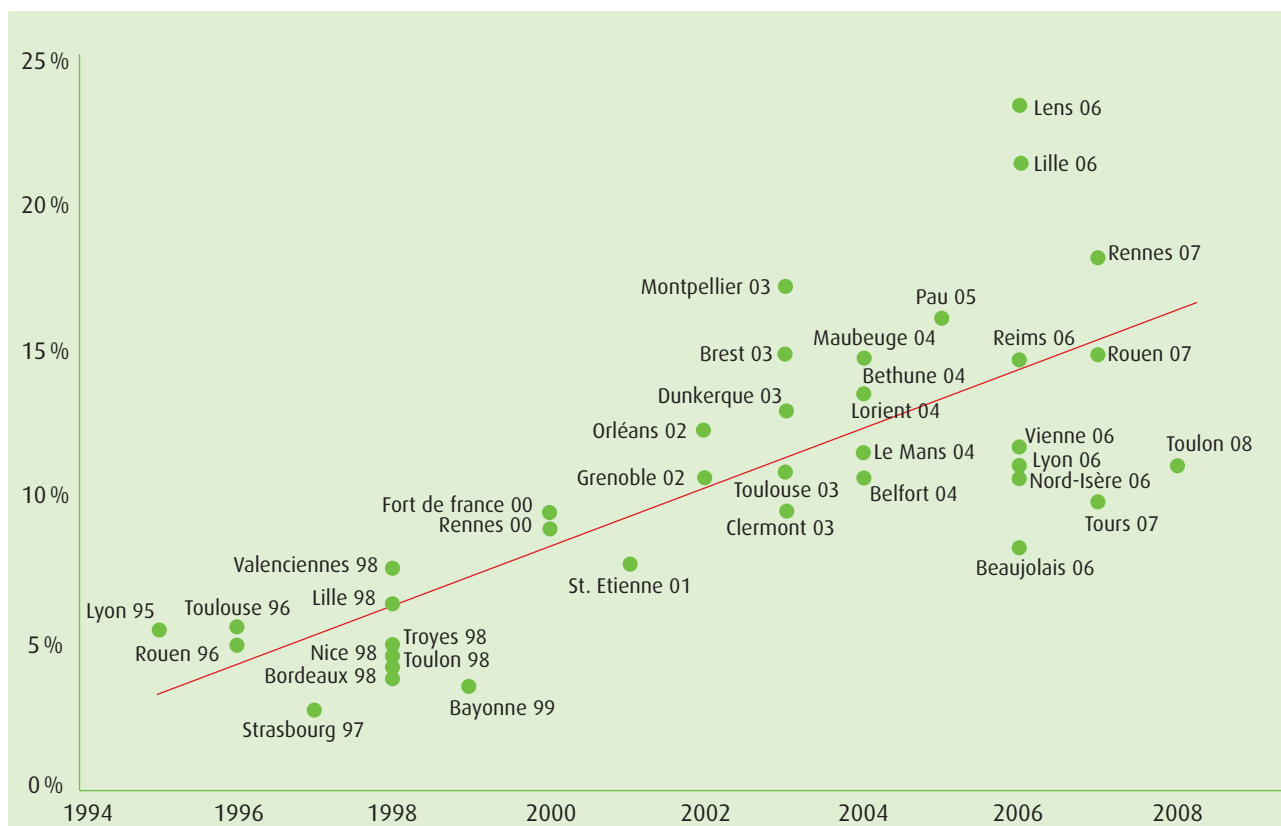
### Universal phone book: who is registered?

The universal phone book was produced at the request of the French ministry for industry, economy and finances, pursuant to a decree of May 27th, 2005. In this directory, only those subscribers appear who wish to do so: the subscriber decides whether to have each of his/her phone numbers (land line or mobile) appear in the directory. For mobile phones, as a subscriber cannot be registered in the directory without his explicit preliminary consent, subscribers existing before the universal phone book was created were not entered, unless requested by the subscriber. This partly explains why the universal phone book does not contain many mobile phone numbers.

Telephone operators must communicate the lists of subscribers to any person wishing to publish a directory. In addition to subscribers who refuse to appear in the directory, the proportion of numbers registered (compared to the total amount of numbers assigned to the subscribers) also depends on these lists being made available by operators to directory publishers. For mobile telephone operators, the percentage of subscribers registered on directory lists is around 3 %, while the percentage of land line subscribers registered is slightly less than 80 %.

## A continuous increase in the number of people who do not subscribe to a land line

### A continuous increase in the number of people who do not subscribe to a land line



Source: "Standard Certu" household travel surveys

## A universal, but not exhaustive phone book

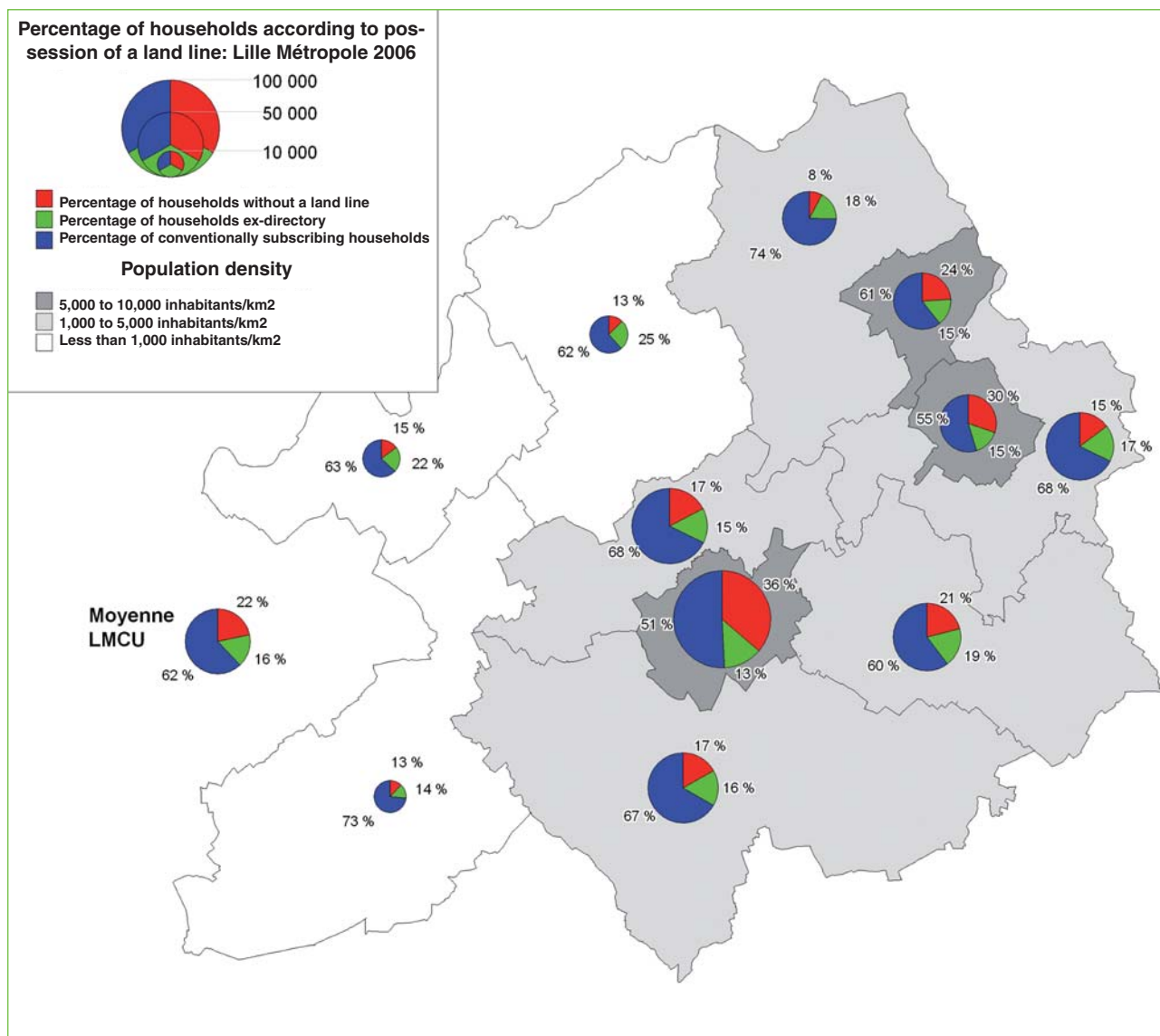
To draw the sample, the directory must be used. However, hardly 80% of land line subscribers appear in the universal phone book<sup>(2)</sup>. In the end, less than two-thirds of subscribers - and therefore a similar proportion of homes - will be located in the sample if only the land line subscriber file is used for drawing.

Adding cell phone subscribers scarcely improves the exhaustiveness of the survey sample file. Although over 90% of the population had a cell phone in March 2009 (this proportion ranges from 69% in Auvergne to 128% in the Paris region), the percentage of these subscribers registered in directories barely reached 3% in June 2009<sup>(3)</sup>.

(2) Arcep, July 2009.

(3) Arcep, spreadsheet of the universal directory observatory on June 23rd, 2009.

## It is in the urban environment that there are the fewest households registered in the land line directory, Lille, 2006



Source: "Standard Certu" household travel survey, Lille 2006

In addition, there are approximately three times more people who do not subscribe to a land line in dense areas than in periurban areas: for example, 18 % in the Montpellier urban transport area in 2003, or in that of Rouen in 2007 and only 6 % in the periurban area. It is therefore in urban areas that the survey sample file provides the poorest cover and is likely to involve a greater bias. For the results of a survey to be reliable, the sample must be "representative". This means that the people interviewed must, taken altogether, "resemble" the population observed as closely as possible. So if the people without land lines had the same mobility characteristics as the others, the results of the travel surveys would not be affected. But this is not the case and the reliability of the data would be weakened if the samples "forgot" these individuals.

### To understand these results

In household travel surveys carried out on a face-to-face basis, it is possible to know whether individuals have a fixed telephone. The mobility of the two populations can therefore be calculated: with or without a land line. These calculations were carried out in several urban areas, in both the dense part, or urban transport area (PTU), and in the periurban area, outside the PTU.

## People who do not subscribe to a land line live mainly in the PTU - Rouen 2007

	PTU	Outside the PTU
Population of resident households	76 %	24 %
Survey area surface	29 %	71 %
Households without a land line	99 %	1 %

Source: "Standard Certu" household travel survey, Rouen 2007

## People who subscribe to a land line: a statistically different mobility

The mobility of those who do not subscribe to a land line is significantly different from the average mobility. In statistics, 95% confidence intervals are usually calculated, which make it possible to measure the accuracy of the data collected. A "true value" would in fact be obtained only by carrying out the survey on the whole population. This is not the case for EMDs, which are carried out only on a sample of the population. The results obtained are therefore estimates that one endeavours to make as accurate as possible by means of the methods detailed in the methodological guide<sup>(4)</sup>.

So the average mobility of all people who live in Toulouse in 2003 had a 95% likelihood of ranging between 4.08 and 4.18 journeys per day. For the mobility of people living in Toulouse who do not have a land line at home, this interval ranges between 4.21 and 4.55 journeys. As the two intervals are completely disconnected, the differences observed are statistically significant and it may therefore be concluded that the mobility of these two populations is different. The results are similar and just as statistically significant if one compares the subscribers to a France Telecom land line and those subscribing to another operator: the mobility of the first ranges between 3.4 and 3.6 daily journeys, while that of the other subscribers is between 3.8 and 4.3.

Those who do not subscribe to a land line also have different-from-average mobility depending on the travel modes. They travel less by car, use public transport more often and walk more. By not taking them into account, mobility by car is therefore likely to be overestimated and walking or public transport underestimated.

There are also differences according to where people live. In the urban transport area (PTU), a dense zone, people who do not subscribe to a land line travel more than the average (0.4 journeys more in Grenoble) but in periurban areas they travel less (0.3 journeys less around Grenoble). Differences are also to be found in mobility by mode. For example, in the Grenoble survey, inhabitants make on average 2.63 journeys by car, while those living in the PTU and not having a land line make only 1.86. For public transport, these figures are 0.30 and 0.96. For walking, the variation is lower: 1.55 journeys for people with no land line living in the PTU, and 1.02 for all the inhabitants in the survey area.

## People who do not subscribe to a land line use their car less, especially if they live in the PTU, Grenoble 2002

### Number of journeys per person per day

	People who do not subscribe to a land line:	People who do not subscribe to a land line living in the PTU	All inhabitants
Car	2,01	1,86	2,63
Public transport	0,69	0,96	0,30
Walking	1,46	1,55	1,02
Together	4,40	4,61	4,20

Source: "Standard Certu" household travel surveys, Grenoble 2002

In green: numbers much higher than the average - In italics: numbers much lower than the average

(4) "Standard Certu" household travel surveys methodological guide, June 2008

## No land line: mainly young people and students

The reason that those who do not subscribe to a land line have different mobility behaviour from the average is because they are a very special population: they are mainly young people and students, and they mainly live in the densest zones of the survey area. In the PTU, the percentage of 18-34 year-olds among those who do not subscribe to a land line is about 60% whereas they account for only 25% of the total population of the survey area; the percentage for students is approximately 20% while accounting for 5% of the total population. The 18-25 age group uses public transport much more and the car much less, unlike the 25-34 age range. Students, more mobile than the average, are especially mobile on foot and in public transport. Consequently, if a sample is drawn from the land line subscriber directory alone, it will predominantly be young people and students that are omitted, and the sample will then be biased.

## Drawing out the sample from the directory: precautions to be taken

In addition, the sample is drawn out by geographical sector. The term "a priori stratification" is used. This process improves the accuracy of the collected data if the mobility behaviours of individuals are as "similar" as possible within a stratum. This is indeed the case if the stratum is the residential zone where inhabitant mobility is closely related to the type of housing (collective or individual), to the public transport supply or to the proximity of road infrastructures.

So since a priori stratification improves accuracy, it is sufficient to draw out a smaller sample than if no stratification had been carried out, while obtaining just as good results, which reduces the costs of the survey. Stratification is therefore important. It can be carried out only if the precise place of residence of the people is known, so as to locate them in zones which are called the "sample-drawing sectors". But in the universal phone book the subscriber may request that his/her full address should not appear in the directory, in which case only the town and the postcode appear (except in the event of names spelt the same way). We do not know the proportion of incomplete addresses in the universal phone book. It may be low today but it is nevertheless likely to introduce a bias into the sample if the people who make this request have a very different mobility from that of the others.

## Do not interview subscribers only

Its characteristics mean that the universal phone book is not usable as a basis for drawing out a sample without taking precautions. It was not initially made for this but it is however possible to use it for this purpose. For this, a method has been developed by Certu to lessen its failings. First of all, only the file of land line subscribers is used to draw out the sample. This has little impact on

the exhaustiveness of the survey sample file, given the low number of mobile phone numbers currently in the directory. Each phone number corresponds to a residence. In household travel surveys, each residence drawn out is replaced by the first adjacent house identified by physically going to the area and checking. This "first adjacent house" is the one which will be questioned. In order not to introduce bias into the sample, it is determined according to rules specified in the methodological guide. This makes it possible to have houses in the sample that will ultimately be interviewed which could not have been drawn out directly from the file of land line subscribers, either because they do not have a fixed line, or because they do not appear in the directory. In these two cases, their occupants can be questioned only on a face-to-face basis, the method required for the household travel survey in urban environments.

## In the periurban area, there are fewer variations

In the periurban area, surveys can be carried out by telephone. First, the questionnaire is shorter than in highly urbanised areas, so it is possible to interview by telephone, especially as only one or two people in the household are questioned. Also, in these areas, the directory is less incomplete and can therefore be used as a basis for drawing out the sample. Young people and students make up only a tiny fraction of the population, around 1% to 3%. The fact that they do or do not have a land line will therefore not make much difference to the representativeness of the sample. In addition, those who do not have a land line (especially employees and labourers) travel around less than the average. Calculations in recent surveys have shown that omitting this population does not significantly modify the mobility results. Certu therefore authorises the use of the land line subscriber file as such as a basis to draw out the sample.

Today, the directory is therefore not the best survey sample file to guarantee the representativeness of the sample drawn out, except if certain precautions are taken. So to guarantee the reliability of the results in "standard Certu" surveys, the sample drawing method explained above has been developed to reduce the risk of error. These precautions are essential because without them some young people, often students, will be absent from the sample. As their mobility is not identical to the average, this is likely to introduce a bias into the results. But this file can be used as such as a basis to draw out a sample in "medium-sized town" and "large area" surveys. For the moment, its failure to provide full cover does not need to be corrected because it does not affect the results obtained. The validity of this observation is checked regularly when processing the household travel surveys in order to continue to guarantee the quality of state-subsidised data collections.

## Three “standard Certu” methods: each type of area has its own type of survey

- “Standard Certu” household travel surveys are suited to dense urban areas. They are carried out on a face-to-face basis and the survey sample files may be a population census (if INSEE performs the survey), the built-on property file of the DGI or the directory of private individuals subscribing to a land line. In this latter case, a special housing selection mode is used to minimize the bias due to the absence of non-subscribers and people not registered in the sample drawing file.
- “Standard Certu” medium-sized town travel surveys (EDVM) are suited to the needs of less urbanised and/or smaller areas.
- Large area travel surveys (EDGT) concern periurban or rural zones close to urban areas, generally as a complement to an EMD. They are carried out by telephone and the survey sample file is the directory of private individuals subscribing to a land line. It is used as a basis for drawing out the sample and therefore does not include all homes but its incomplete coverage does not, for the moment, affect the quality of the results obtained.

## Further information

- *Distances de déplacements et effet de serre, où sont les enjeux en milieu urbain ? - Travel distance and the greenhouse effect: what’s at stake for the urban environment?* November 2008.
- *L’enquête ménages déplacements « standard Certu », “Certu standard” household travel survey, methodological guide, Certu, May 2008.*
- *Les recueils de données sur la mobilité urbaine - Data collections on urban mobility, Certu, February 2008.*
- *La mobilité des années 2000, Vers un « découplage » entre la possession et l’usage de la voiture ?, Certu - Urban mobility in the 2000s. Breaking the link between car ownership and car use ?, Certu, October 2007.*
- *La mobilité urbaine en France : les années 90, Certu - Urban mobility in France: the 90s, Certu, August 2002.*

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