

METHODOLOGY SHEET: INDICATOR N° 3**Title****LOCAL MOBILITY AND PASSENGER TRANSPORTATION****Headline indicator: Percentage of trips by motorised private transport****Measurement**

- a) number of daily trips and time taken per capita by reason for trip and by mode of transport
- b) total average daily distance covered per capita by reason for trip and by mode of transport

1. Definition

This indicator investigates and represents the mobility of citizens living within the local authority area. The different aspects (and the related units of measurement) that contribute to defining the general model of mobility of each citizen include:

- a) the number of trips that, on average, each citizen makes during the day, where 'trip' indicates a displacement with a starting-point and a destination (number of daily trips per capita);
- b) the reason for the trips and their regularity during the week, allowing for the trips to be classified as either 'systematic' or 'unsystematic'¹ (% of systematic trips compared with the unsystematic ones);
- c) the average distance covered by each citizen during the day (km/per capita);
- d) the time taken by each citizen for his/her trips (minutes taken for the trips);
- e) modes of transport used for the trips and/or for the different distances associated with each trip (% relating to the different modes of transport considered).

2. Question

- What is the level of passenger mobility in the municipality?
- Are the distances covered by citizens increasing?
- What modes of transport are used for the daily mobility of citizens?

3. Context

The model of citizens' mobility in an urban context is important with regard to both the quality of life of those directly involved (time devoted to trips, frequency of traffic congestion, costs, etc.) and to the level of environmental pressure exerted by mobility. Data emerging from various surveys of urban mobility, highlight developments that have taken place in recent years.² There is a close linkage between mobility and other important themes in an urban

¹ "Systematic trips" are the daily displacements to/from work/school. "Non systematic" or "unsystematic" are the ones made for all other reasons, for example, to go shopping and for social or recreational reasons.

² These may be summarised as follows:

- there are only limited variations in the average daily number of trips per capita, even after an interval of years: in general, the number of trips that a citizen makes each day has not varied significantly (obviously, with regard to the same groups: students, workers, pensioners, etc.).
- the distances covered for each trip have, however, varied considerably in the last few years and show a general tendency to increase.

context, including air quality, carbon dioxide emissions, noise, road safety, space consumption and urban landscape. It is desirable to achieve a progressive reduction in individual motorised mobility and at the same time achieve an increase in the use of alternative modes of transport.

Sustainability principles covered: 1, 3, 4, 5, 6

4. Targets

Even if no specific targets exist, the need to reduce both the demand for mobility and individual motorised mobility is recognised in Europe. The importance of promoting alternative and light modes of transport (such as collective transport or, where feasible, cycling) is also recognised, especially in the urban context, with a view to reducing dependence on the car.

5. Units of measurement

Principal Indicator:

a) average number of daily trips per capita (split into reason for trip, if possible also systematic vs. unsystematic, and into mode of transport), average time taken for trips.

Supplementary Indicator:

b) average distance daily covered per capita (split into each mode and into each reason).

6. Frequency of measurement

a) triennial

b) triennial

7. Data collection method and sources

Generally speaking, there is a lack of sufficiently homogeneous and updated data for the calculation of the indicators selected here.

More occasional and heterogeneous surveys may be made available as part of general population censuses (e.g. in Italy, every ten years ISTAT (Istituto Nazionale di Statistica) surveys trips to school and work according to mode of transport used and time taken); or as part of specific studies undertaken on a local level for the development of sectoral plans (traffic and urban mobility plans, public transport plans, etc.).

Consequently, it is inevitable that use will be made of data obtained directly by means of surveys of statistically significant samples of the population living in the city.³

The costs will vary depending on the size of the sample and on the complexity of the data obtained. Costs could be reduced and the communicative effect of the survey could be enhanced by linking data collection (citizens surveys) to a local campaign to promote the 'Car Free Day' or other activities aimed at increasing public awareness ('Mobility Watching Day').

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- moreover, the changes in the modal split are significant: in general, trips by bicycle or on foot are fewer, while trips using motorised modes of transport have increased, especially individual motorised modes.
 - the time taken for single trips change above all as a result of the distance covered: despite this, a number of writers contend that the average time devoted to trips tends to remain constant. Although the time taken is the same, the speed of the journey has increased and, consequently, so has the distance covered.

³ The minimum age of individuals in the sample should be consistent with the one taken as the maximum for the indicator 6 which is the age when one is allowed to drive scooters (according to specific national legislation).

Principal indicator

A simple questionnaire can be used for the calculation of the number of trips (by reason for trip, mode of transport, time taken). The survey is carried out by means of a family logbook on a statistically significant sample of families (that is, a sample of families selected according to criteria of representativeness⁴, where individuals sampled shall be older than the age when they are allowed to drive scooters – according to specific national legislation). The survey could be obviously linked to and managed with any other the local authority intends to develop - i.e. the one for indicators 1, 6 and 10, as suggested in the logbook structure; in this case the logbook has to be compiled by each family member.

Information useful for the calculation and the evaluation of indicator 3 can be found at the beginning of the section relevant to indicator 3 – e.g. sex, age, employment condition (employed, unemployed, retired, student). Relevant questions are illustrated in the table below; the information filled in the table shall refer to a given day (e.g. the preceding weekday⁵).

Trip no.	Reason/ Type*	Mode of transport**	Place of departure	Time of departure	Place of arrival	Time of arrival	Distance covered (km)
1							
2							
N							

(*) Reason for the trip: school, work, recreation/leisure (social relationships, private reasons, errands and other), shopping, return trip.

(**) Mode: walking, cycling, motorcycle or moped, private car (specifying whether as passenger or driver), taxi, collective transport (bus, tram, metro, local railway); combined mode “park & ride” (exclusively in case of the combination of “private car and public transport”). Please note that trips on foot or by bicycle are not to be considered if carried out in combination with other modes; in fact in such cases the trip mode corresponds to the mode identified as the main one on the basis of distance covered.

The following questions – very useful for local purposes – should be asked only to those who answered “private car” or “park & ride” (private car and public transport) to the question on mode of transport.

Trip no.	Parking place *	Number of passengers **	Reason for choice ***
1			
2			
N			

(*) Parking place: 1. private parking (toll required); 2. public parking (toll required); 3. toll-free parking.

(**) Number of passengers: during the trip, the private car carried: 1. only the driver; 2. the driver and one passenger; 3. the driver and more than one passenger.

(***): Reason for choice (2 reasons max): 1. higher speed; 2. higher comfort; 3. lower costs; 4. absence of alternatives (absence of acceptable public transport); 5. unfavourable weather conditions; 6. other (to be specified/no answer).

⁴ The sampling methodology is illustrated in detail in the logbook methodology sheet.

⁵ If the day considered were to prove not statistically significant for the interviewee (ill, not at work, away on business), the last significant day shall be considered.

Only with regard to trips from/to school/work, a question on the quality of the trip shall be asked as follows:

“Please tick as appropriate in the length/duration and comfort cells, to express your judgement on the quality of your trip from/to school or work”

Mode of transport	Length/ Duration										Comfort									
	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10

Supplementary indicator

This part requires a more elaborate methodological approach because the distances covered are difficult to quantify reliably by simple interviews. Consequently, the data may be collected in two main ways:

1. a matrix of the starting-point/destination of the chosen sample is constructed, and the interviewees are asked to state the starting-point and destination of each trip; subsequently, the related distances are reconstructed by means of suitable calculations. This method may be adopted on the occasion of general population censuses (e.g., in Italy, every ten years), with the interviewers specifying as appropriate the starting-points and destinations of the citizens' systematic trips.
2. a statistically significant sample of citizens is selected; they are asked to record the distance covered for each trip for a certain period (in a 'logbook').

8. Form of reporting/presentation

The indicators are presented as figures:

- a) average number of daily trips per capita;
- b) total number of daily trips split into: reason for trip, mode of transport, average time taken for trips (once defined specific duration classes);
- c) average distances daily covered per capita: average km covered for reason and for mode of transport;
- d) percentage of total trips for reason and length class and percentage of total trips for mode of transport and for length class.

For the first year and for each part (total number of trips, average time spent and average km per capita per day), the results must be presented in a table like the following one:

Tab 1. daily total number of trips (and %); Tab 2. per trip average time taken; Tab 3. per trip average km per capita	walking	cycling	motorcycle or moped	private car	taxi	collective transport	combined mode "park & ride"
school							
work							
recreation/leisure (social relationships, private reasons, errands and other)							
shopping							
return trip							

In the following years, the historical trends could be reported using bar graphs where each bar corresponds to:

- **Graph 1.** daily average number of trips for a single year split into modes of transport (one bar for each reason);
- **Graph 2.** daily average time spent for a single year split into modes of transport (one bar for each reason);
- **Graph 3.** daily average km per capita for a single year split into modes of transport (one bar for each reason).

9. Examples of similar applications

The modal split (%) is widely used in "State of the Environment Reports" (e.g. Bologna and Turin). The supplementary indicator was used by the European Environment Agency (in *Environment in the European Union at the Turn of the Century*, 1999) as 'Passenger transport modal split in the EU (EU averages)' calculated as billions of km travelled by passengers by car, air, rail or bus.

Three European projects, ELTIS (European Local Transportation Information Service, promoted by the DG VII Directorate General for Transport), TERM (Transport and Environment Reporting Mechanism promoted by the European Environment Agency) and Urban Audit (promoted by the DG Regio), make use of similar indicators. The first one uses the % of passenger trips made by private car, public transport, walking, bicycle, powered two wheelers or by "other" modes of transport. The second one uses the total number of passengers by mode and purpose, the total number of passengers per km by mode and purpose, the km-passenger by mode and purpose per capita and the km-passenger by mode and purpose per GDP. Urban Audit uses the Proportion of trips to work by public transport, the Proportion of trips for non-work purposes and the Proportion of trips to work.

10. Questions to address/Future developments

On the basis of survey results it may be useful to make a number of further choices as to which particular aspects of urban mobility to investigate, adapting the methodology accordingly. In particular, the elements requiring clarification include:

- a) **Trips: number of daily trips per capita.** It is necessary to determine if i) the trips should be quantified with reference to the average situation during the year (subjective estimate) or on a specific day; ii) if the trips should be considered singly, or if return trips should be calculated separately.
- b) **Reasons: % of systematic trips versus % of unsystematic trips.** It is necessary to determine whether this level of disaggregation is satisfactory, or whether a more detailed level should be used (e.g. systematic trips: school, work; unsystematic trips: shopping, access to services, social relationships, recreation, etc.).
- c) **Modal split: % of different modes of transport considered.** It is necessary to determine: i) if the percentage distribution should refer to the number of trips or to kilometres covered; ii) which modes of transport should be specified: e.g. walking, cycling, motorcycles and mopeds, private car (possibly specifying whether as passenger or driver), taxi, collective transport (bus, tram, metro, local railway), combined mode – park & ride.

11. Keywords

mobility, passenger transportation, mode of transport, private car, motorcycle, moped, collective transport, cycling, walking.