

# **People encountering disabling travel situations: personal characteristics and mobility features**

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## **Abstract**

Ageing of the population, urban sprawl, inexistence of nearby services, increasing fragmentation of social and family networks will change travel patterns and may result in more difficulty to meet the desire of mobility. The first objective of this paper is to measure the impact of various medical and socio-demographic characteristics on the difficulties encountered during mobility. A second objective is to give elements for a better understanding of daily mobility of people expressing difficulties when making trips. The analysis is based on two national surveys conducted in France: a national survey on disabled people and a national travel survey. Findings show that the ageing of the population should increase the number of people with travel difficulties and affect travel patterns.

## **1. Introduction**

The current ageing of the population in France should continue in the future years. In 2050 over one third of the population will be over 60 years, against one fifth in 2000 (Brutel, 2002) Thus, in 2050 22.4 million people will be aged over 60 years, 11.6 million over 75 years and 4.8 million over 85 years. This demographic change, accompanied by social

changes could modify the mobility behaviour of the population in future years.

This paper has two main objectives: the first one is to measure the scope of various medical and socio-demographic characteristics on difficulties encountered when travelling, such as impairment, age, gender, professional occupation, household size and household car ownership. A second objective is to give elements for a better understanding of the daily mobility of people expressing difficulties in travel situations.

This research is based on two national surveys conducted in France: firstly, the survey Handicaps-Disability-Dependency (Handicap-Incapacité-Dépendance, HID; with a respondents sample size of about 17000) on the consequences of health problems on physical integrity, daily and social life of people not living in an institution, in 1999 (Mormiche, 1998). Secondly, the National Travel Survey (Enquête Nationale sur les Transports et les Déplacements - ENTD) that was conducted in France in 2007-2008. This survey set out to study travel behavior and use of personal and public transport modes of households living in France. The national travel survey with a sample size of about 20,000 households, consider all trips whatever their purpose, length, duration, transport mode, the period of year or time of day. Situations of disability are identified on the basis of respondent's self-reported travel difficulties. Both samples were drawn from the census, and for the HID the households concerned by disability/handicap had an highest probability to be drawn.

Disability which was for a long time considered to be a form of infirmity is now seen more as the outcome of a set of environmental, political, cultural and technical obstacles. More exactly, disability is seen as being: "...the expression of a conflict between an individual's activity limitations, i.e. functional reduction, and daily life" (Minaire, 1992). It therefore seems worthwhile to identify the persons who are in disability situations when they travel, based on the difficulties they reported rather than a priori by identifying their activity limitations. Both surveys identified three levels of travel difficulties: simple difficulties, limitations on certain itineraries and limitations on all itineraries (i.e people who can't move alone). According to the ENTD, in France in 2007-2008, about 10% of individuals over 15 years (i.e. 49 millions individuals) reported difficulties when making trips outside their home.

In a first part of this paper we examine the personal characteristics of people who face these difficulties.

## 2. Impact of personal characteristics on difficulties when making trips

### 2.1 Influence of impairments

According to the HID survey, 51 % of the people affected declare only one impairment, while the other half have between two to twelve impairments. Also, because each person can have several impairments, it seems important to study the consequences of each impairment on the feeling of discomfort when travelling "all things being equal", that is to say taking impairment one after another. For that, we have carried out a logistic regression with a logit model (Winkelmann & Boes, 2006; Mukerjee et al., 1998) on the discomfort or not in travel, by including all identified impairments (39 impairments) as explanatory variables.

It appears that only four of the included impairments are not significant, in other words they have no influence over this discomfort: the stutter, the other visceral impairments (such as genitor-sexual), the unspecified mental disorder and the multiple handicap. Among the other 35 impairments, 34 have a positive influence on the difficulties encountered in travel (table 1): declare one or the other of these impairments increase the probability of declaring a discomfort when making trips.

The abilities of ambulation, communication and location are principal skills used during travels. Thus, it isn't surprising to find, among the impairment that have the most important parameter, being blind or affected by a motor impairment of at least one lower limb (four limbs, one side of the body, two lower limbs, one leg).

Impairment	parameter	chi2
Blind	2.8096	<.0001
Four limbs (Quadriplegia...)	2.7348	<.0001
Paralysis of one side of the body (hemiplegia ...)	2.3714	<.0001
Two lower limbs (paraplegia. paralysis. amputation...)	2.3005	<.0001
Backwardness	1.8353	<.0001
Loss of consciousness (epilepsy)	1.3599	<.0001
One leg (paralysis. amputation. fracture...)	1.2828	<.0001

Dumb	1.2619	0.0107
Other motor limbs impairments	1.1673	<.0001
Other motor impairment	1.1374	<.0001
Behaviour disorder. personality disorder. impairment of relational capacities	1.0049	<.0001
Partially sighted	0.9723	<.0001
Vertigo	0.8664	<.0001
Deaf	0.7981	0.0006
Trunk impairment	0.7941	<.0001
Motor impairment unspecified	0.7593	<.0001
Other language or speech impairment (laryngectomy...)	0.7312	0.0007
Slight intellectual impairment. acquisition and learning disorder.	0.6765	<.0001
Asthenia. fatigue	0.6699	<.0001
Respiratory impairment	0.657	<.0001
One arm (paralysis. amputation. fracture...)	0.6557	<.0001
Cardiovascular impairment	0.6558	<.0001
Loss of intellectual capacities. memory impairment. spatial/temporal disorientation	0.5685	<.0001
Pain	0.5576	<.0001
Other language impairment (aphasia. dyslexia...)	0.5518	0.0259
Impairment of the digestive tract and organs	0.4395	<.0001
Disease without impairment	0.4219	0.0002
Other visual impairment	0.4091	<.0001
Blood or immunity impairment (aids. haemophilia...)	0.3934	0.0417
Other impairment or impairment unspecified	0.3717	<.0001
Renal or urinary impairment	0.3553	0.0026
Mood disorder. depression...	0.3487	<.0001
Hearing-impaired	0.348	<.0001
Endocrinal impairment (diabetes. thyroid...)	0.264	0.0032
Aesthetic impairment	-0.5542	0.0028

Source: INSEE – HID 1999

**Table 1.** Explanatory impairments in discomfort declared during travels

## 2.2 Influence of sociodemographic characteristics

To isolate the specific impacts of each sociodemographic variable, we have done a logistic regression on the presence or the absence of travel difficulties, by including the various sociodemographic characteristics as explanatory variables. The gender, the number of persons in the household, the type of dwelling and the zone of residence did not achieve statistical significance.

We can state that (table 2):

- The difficulties during trips increase with age;
- Persons from non motorized households have a higher probability of having difficulties than persons from households with one car, and this probability is even higher compared with persons from multi-motorized households;
- Having a professional occupation affects the probability of reporting difficulties: this probability is higher among those without a professional occupation and retired.

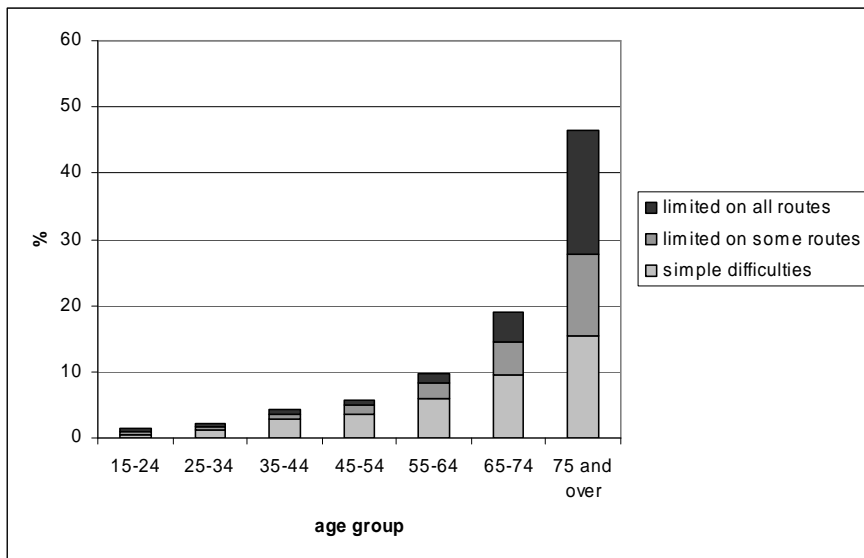
	Parameters	Probability >Chi2
<b>Age</b>		
Under 55 years	-0.9911	<.0001
55-64 years	-0.1912	0.0001
65-74 years	0	référence
75 years and over	1.1214	<.0001
<b>Level of car ownership</b>		
0 car	0.767	<.0001
1 car	0	référence
2 cars and more	-0.6313	<.0001
<b>Professional activity</b>		
Working	0	référence
non-working	0.4004	<.0001
Retired	0.3864	<.0001

Source: INSEE – HID 1999

**Table 2.** Explanatory factors of discomfort in travel

We will examine more precisely these three characteristics in part 3, with the comparison of people with and without difficulties.

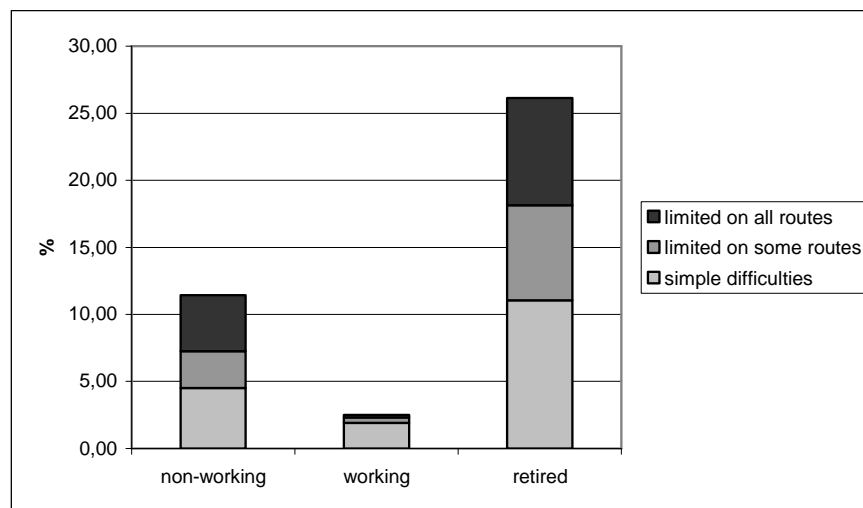
The travel difficulties increase with age. Indeed, we observe that age influences disability situation (graph 1): the percentage of persons reporting travel difficulties increases with age. Indeed, less than 6% of individuals reported difficulties in the youngest age groups (the under 55 years old), while they were about 10% of the 55 to 64 years old, 19% of the 65 to 74 years old and 46% of those aged 75 years old and over. Moreover, over the age of 65, a non-negligible percentage of the population experienced the most severe difficulties, i.e they can't move alone. In the context of ageing, the number of people with travel difficulties should thus increase in coming years.



Source: INSEE – ENT D 2007-08

**Graph 1.** Level of reported difficulties according to age group

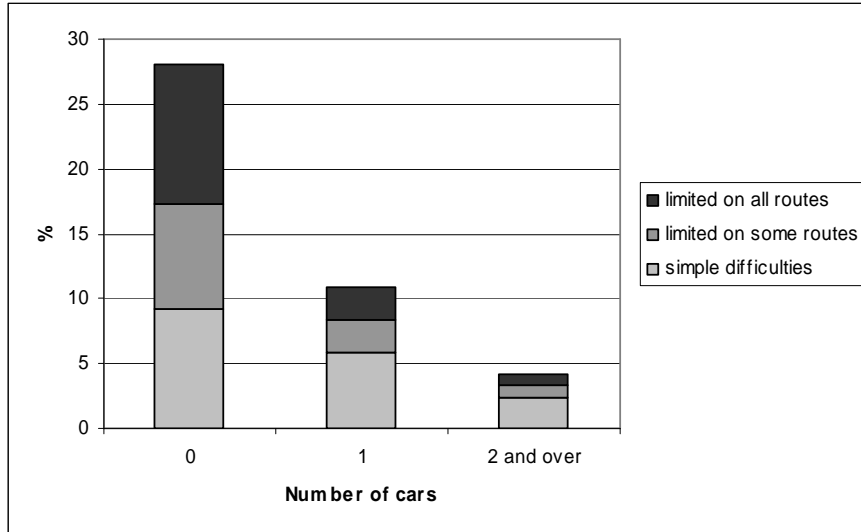
If we consider the percentage of persons who reported difficulties according to professional activity, we see that this percentage is higher among persons without activity and retired, respectively 11,4% and 26,1% (graph 2).



Source: INSEE – ENTID 2007-08

**Graph 2.** Level of reported difficulties according to the professional activity

Finally, the percentage of persons who experienced difficulties is higher among non-motorized households (28%) than among households with one car (11%) and even higher than among multi-motorized households (4%) (graph 3). This gives the impression that the car, which is frequently perceived as a source of freedom and autonomy, facilitates travel. Not owning a car may make people's mobility more difficult, or even impossible.



Source: INSEE – ENT D 2007-08

**Graph 3.** Level of reported difficulties according to household car ownership

In this first part, we observed that the declaration of impairment (apart from the stutter, the other visceral impairments, the unspecified mental disorder and the multiple handicap) is accompanied by a higher probability of declaring a discomfort in travel situations. However, this discomfort when making trips depends on the type of impairment. The impairments that affect the ability of ambulation, communication and location seem to be the most important in the declared discomfort. Beyond the impairments, several socio-demographic characteristics influence the discomfort in travel: age, professional activity, and level of motorization.

Now that we have characterized the persons that are in disability situations, in the second part of the paper we attempt to analyze the travel behavior of persons that are in disability situations when travelling, comparing them with people not reporting any difficulty.



### 3. Mobility of people with and without difficulties

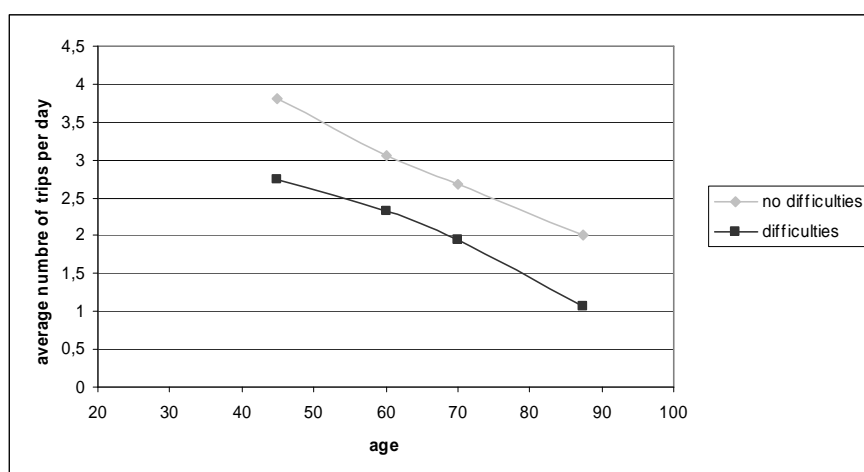
When we observe the mobility of the week (we are ruling out trips on Saturday and Sunday), we can see that people with difficulties in their travel are less mobile than others (Madre, 1997).

#### 3.1 Number of trips

People reporting travel difficulties make about 1.8 trips per day, which is almost only half of the mobility of those without difficulties (3.4).

Now, if we consider the average number of trips per day with reference to various sociodemographic characteristics, we can observe differences.

The curves of the average number of trips per day and per person for people with and without difficulties are almost parallel. The more we move forward in age, the more the number of trips decreases, which were experiencing difficulties or not. Thus, while the number of trips of people without difficulty, decrease from 3.8 between 35 and 54 years to 2.0 over 75 years, this figures are respectively for those with difficulty from 2.7 to 1.1 trips.



Source: INSEE – ENTID 2007-08

**Graph 4.** Average number of trips per day according to age

When we consider the average number of trips per day, according to the declared difficulties, with various sociodemographic characteristics, we observe (table 3):

- Few differences between men and women.
- The difference in the number of trips between workers and non-workers is greater for people with difficulties than those without difficulties.
- The more households own cars, the higher the number of trips is. Thus, individuals living in a non-motorized household make 2.9 trips for people without difficulties and 1.4 trips for people with difficulties. For those in multi-motorized households, these figures are respectively 3.6 and 2.2.

<b>Characteristics</b>	<b>No difficulties</b>	<b>Difficulties</b>
<b>Gender</b>		
man	3.3	1.9
woman	3.4	1.8
<b>Professional activities</b>		
worker	3.7	3.1
non-worker	3.2	1.6
retired	2.6	1.5
<b>Number of cars</b>		
0	2.9	1.4
1	3.2	1.9
2 et +	3.6	2.2

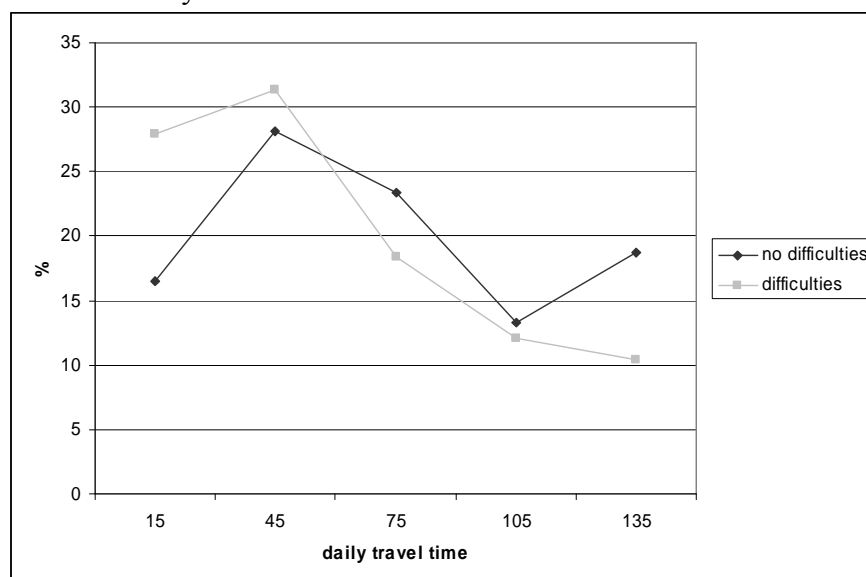
Source: INSEE – ENTD 2007-08

**Table 3.** Average number of trips per day per person according to various sociodemographic characteristics

### 3.2 Daily travel time and distance of trips

People having difficulties when making trips travel less than those without. We found similar results in term of immobility (people staying at home the all day), Therefore we will keep only “mobile” persons in the following sections. We can observe that the daily travel time of people reporting difficulties is lower than people without (graph 4).

Among those reporting difficulty 28% have moved less than 30 minutes the day before the survey, against only 16.5% for people without difficulty.



Source: INSEE – ENTD 2007-08

**Graph 4.** Population distribution by daily travel time

If we consider all trips, we can observe a difference in term of crow flight distance between the origin and destination municipalities between persons with and without difficulties (table 4). Almost 62% of trips of people experiencing difficulty have for origin and destination the same municipality.

<b>Crow flight distance between the origin and destination municipalities</b>	<b>no difficulties %</b>	<b>Difficulties %</b>
Staying in the same Municipality	48.0	61.7
0.1-5 km	17.6	13.9
5.1-10 km	15.1	12.4
>10km	19.2	12.0

Source: INSEE – ENTD 2007-08

**Table 4.** Straight line distance between the origin and destination municipalities

#### 4. Conclusion

As disability situations are nowadays defined as a conflict between personal factors and environmental factors, the French HID and ENTD surveys have allowed us to detect and characterize persons in disability situations during their trips, on the basis of their responses to the question about their travel difficulties. In France, in 2007-08, about 10 % of the respondents reported being in a disability situation.

Persons in a disability situation travel less than persons who report no difficulties (Bakker & Van Hal, 2006; Madre & Bussière, 1996), in terms of number of trips, distances covered and daily travel time.

Both the disability situation and the mobility are influenced by several sociodemographics characteristics, in particular advancing age, lack of professional occupation and not owning a car. These last two characteristics can both influence the situation of disability, and be influenced by it: the impairment can indeed reduce the ability to drive and work

So the car appears to facilitate mobility. This leads us to believe that car use brings less difficulty than the use of other modes, such as public transport, not very accessible. Also, the working and non-working people have different needs in terms of mobility and will therefore not have the same behaviour.

Finally, as the elderly have been identified as more frequently being in a situation of disability when they make trips than other groups, the aging process which is currently taking place in developing countries may have a major impact on travel difficulties and, more generally, travel practices (Bush, 2003; Dejoux et al., à paraître).

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