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# Travel Distances and Travel Times to Nearest Health Care in Metropolitan France

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**Access to medical care has become a central issue in the current context of major hospital sector reforms and the anticipated decline in the number of physicians on the French territory. Measured in terms of physical distance and travel time, this study examines the spatial accessibility of nearest ambulatory and hospital care on January 1st 2007. An innovative methodology is proposed for the identification and geolocation of the main specialities provided by hospitals.**

**Travel times are generally satisfactory; 95 % of the French population has access to primary care in less than fifteen minutes. Similarly, the majority of private practice specialists and the most usual medical equipment are accessible by road in less than 20 minutes on average. 95% of the French population can equally access usual hospital care in less than 45 minutes, and 75% in less than 25 minutes.**

**However, inequalities in access to health care persist for both common and rare medical specialities. Rural regions, with a low population density, combine remoteness of both primary care and most of specialised ambulatory care. Since 1990, the average distance travelled to access care has decreased for some specialists, in particular urologists, and increased for others, notably paediatricians.**

With the restructuring of the French hospital sector and the anticipated decline in the number of private practitioners, geographic access to health care has become a core public health issue. It was first introduced in the July 21st 2009 Hospital, Patients, Health and Territory Law[1] instituting the Regional Strategic Health Plans[2] that defined geographic 'health areas'. In broader terms, the question of physical distance between consumer and provider is one of the stated challenges of the national sustainable development strategy 2009-2013 in its aim to promote 'sustainable mobility practices for people and goods by encouraging proximity development' and ensuring 'access to services and mobility for all throughout the space'.

This study establishes a panoramic overview of the spatial accessibility to health care in metropolitan France on January 1st 2007, date on which medical ratio and the number of private practitioners in France had reached unprecedented levels. In the coming decade, these levels will both decline temporarily but significantly. In parallel, population growth will continue and the percentage of elderly persons, major health care consumers with reduced mobility, will increase.

Spatial accessibility is measured for each municipality by estimating the physical distance to the nearest ambulatory and hospital care services by road (Methods insert). Travel distance is calculated in kilometres together with travel time. The aim is equally to identify distance thresholds beyond which access to specialist care, a hospital speciality or complex medical equipment

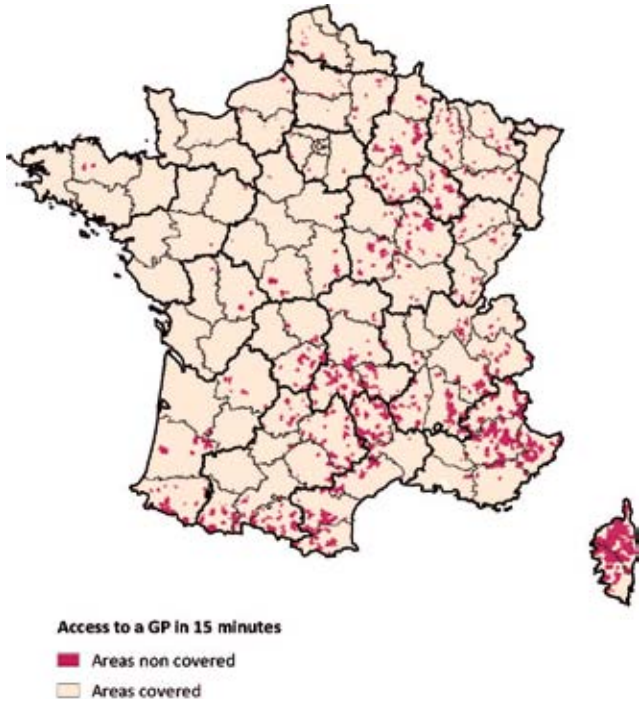
[1] Copy editor's note: Loi Hôpital, Patients, Santé et Territoires (HPST)

[2] CE's note: schémas régionaux d'organisation des soins (SROS)

IRDES Institut de recherche et documentation en économie de la santé
DREES Direction de la recherche, des études, de l'évaluation et des statistiques

C1

## Access to a GP in 15 minutes




Sources : Sniiram, Chronomap.
Cartographie : Irdes.

## Méthode

### Spatial accessibility

Spatial accessibility to care is defined as the ease with which the population of a given area can reach public service facilities. It can be apprehended in different ways as the following classification demonstrates.

| Concept | Measure of accessibility |
|---|---|
| Availability within a geographical unit | Number of services within the geographical unit |
| Availability within the neighbourhood | Number of services within a given distance |
| **Immediate neighbourhood** | **Distance between a given location and the nearest service** |
| Average travel distance to service | Average distance between a given location and specific service location |

Source: Apparicio *et al.* (2008)

The measurement chosen for this study is that of immediate neighbourhood, that is to say the distance the population needs to travel to reach the nearest service required in each municipality. For each municipality, distances are calculated from the municipal town hall concerned to that of the municipality where the closest services are located. The distance is null when the municipality in question is equipped with the service in question which leads to an underestimation of distances travelled.

Distances are measured in travel time and kilometres travelled by road using a distance calculator and a geographic information system (GIS). The model proposed by default provides speeds per type of road based on the national road statistics. The average distances are distances adjusted by the municipality populations to take into account the number of individuals concerned.

## Repères

This edition of *Issues in Health Economics* is taken from a report on the travel distance to ambulatory and hospital care established on behalf of the Directorate for Research, Analysis, Evaluation and Statistics for the Ministry of Health (DREES)[a].
It falls within the framework of IRDES research on the geographical accessibility of care and the definition of relevant health territories. This article providing the key descriptive results of the report is simultaneously published in the DREES review 'Études et résultats'.

[a] Coldefy *et al.*, 2011.

becomes difficult, and to quantify and localise populations furthest removed from health care facilities.

The data bases available for distance to care analyses are multiple and specific to either ambulatory care or hospital care. Data concerning ambulatory care were extracted from the SNIIRAM[3] data base which provides the number of self-employed health professionals in activity for a given year. An innovative methodology for the identification and geolocation of specialist hospital services was elaborated from the French National Hospital Database[4], the annual health establishment statistics[5] (SAE) and the national directory of health and social establishments[6] as the different administrative data bases no longer contain detailed information of this kind (Sources insert). SAE and SNIIRAM data was equally used to identify complex medical equipment.

## Primary care accessible in less than 15 minutes for 95 % of the population

The measurement of the spatial distribution of care reveals that access to primary care (defined here as care provided by general practitioners, nurses, physio-

[3] Système National d'Informations Inter- Régimes de l'Assurance Maladie (National Health Insurance Cross-schemes Information System)

[4] CE's note: Programme de médicalisation des systèmes d'information (PMSI)

[5] CE's note: Statistique annuelle des établissements de santé (SAE)

[6] CE's note: Fichier national des établissements sanitaires et sociaux (FINESS)

therapists and private practice dental surgeons) is globally satisfactory since 95% of the French population have access in less than 15 minutes. Geographic access to general practitioners in particular is equally very satisfactory: less than 1% of the population reside in 4% of the municipalities requiring over 15 minutes travel time to access a GP in 2007 (map 1). This concerns approximately 600,000 individuals primarily living in rural or mountainous regions that equally cumulate a number of other disadvantages related to their geographical isolation, notably remoteness from other equipment and services. Three regions are particularly affected: Corsica, Auvergne and Champagne-Ardenne, with respectively 11%, 1.5% and 2% of the population residing at over 15 minutes travel time from a GP. Regions such as these, where the populations' access to care is particularly difficult, require the implementation of innovative and specific solutions in terms of organisation and financing if equitable access to care is to be guaranteed in France.

## Private practice specialists and the most common hospital specialities are accessible in less than 20 minutes

Concerning specialist care and medical and surgical disciplines, the majority of private practice specialists are on average accessible in less than 20 minutes by road (graph 1). Almost the entire (95%) French population have access to the following services in less than 45 minutes by road: orthopaedics, digestive surgery, maternity, digestive endoscopy, hepatogastroenterology, cardiology, nephrology and pulmonology, and three quarters of the population in less than 25 minutes (graph 2).

### Rural areas with a low population density face the longest travel times to reach private practitioners

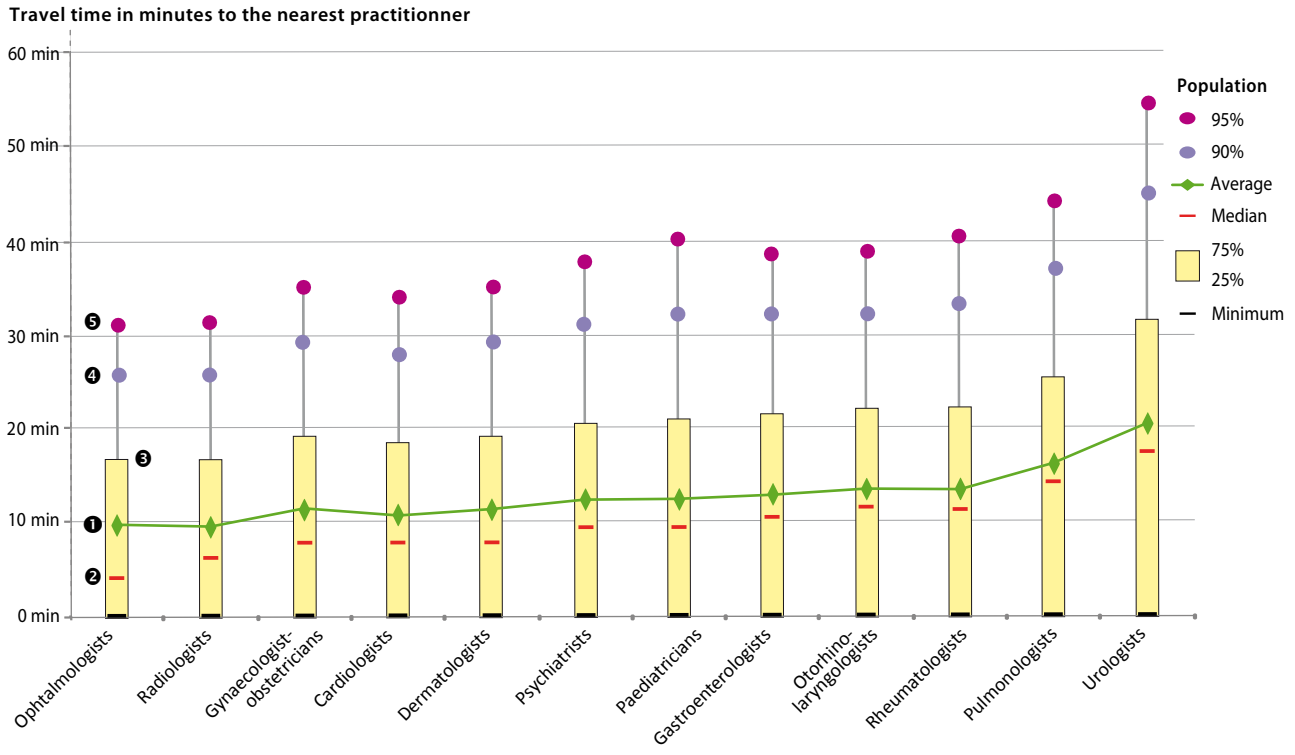
The same regions accumulate remoteness from both primary care networks and private practice specialist care for the most common specialities as well as the rarest. Individuals residing in Corsica, Limousin, Burgundy and Auvergne, rural regions with a low population density, are subject to longer travel times. In these regions, a fifth (20%) of inhabitants live at over 30 minutes travel time by road from the nearest specialist. At distances requiring over 45 minutes travel time, only 1 to 3% of the population is concerned.

### Sector 1 specialists are more difficult to access especially in Île-de-France

These results should, however, be modulated according to whether the practitioner operates under the regulated or unregulated payment sector as spatial access can be combined with financial access: the rarer the service (in terms of accessibility), the greater the geographical access to a sector 1 practitioner (state regulated fees) becomes difficult in comparison with access to practitioners operating in both sectors 1 and 2. More than the urban or rural

G1

**Distribution of travel times to private practitioners on January 1st 2007**




**Reading guide:** If, on average, the population takes 9 min ❶ to reach the nearest ophthalmologist to their home, 50% of the population has access in less than 3 min ❷, 75% in less than 17 min ❸. However, 10% of the French population is situated at over 25 min ❹ and 5% at over 30 min ❺ from this type of specialist.

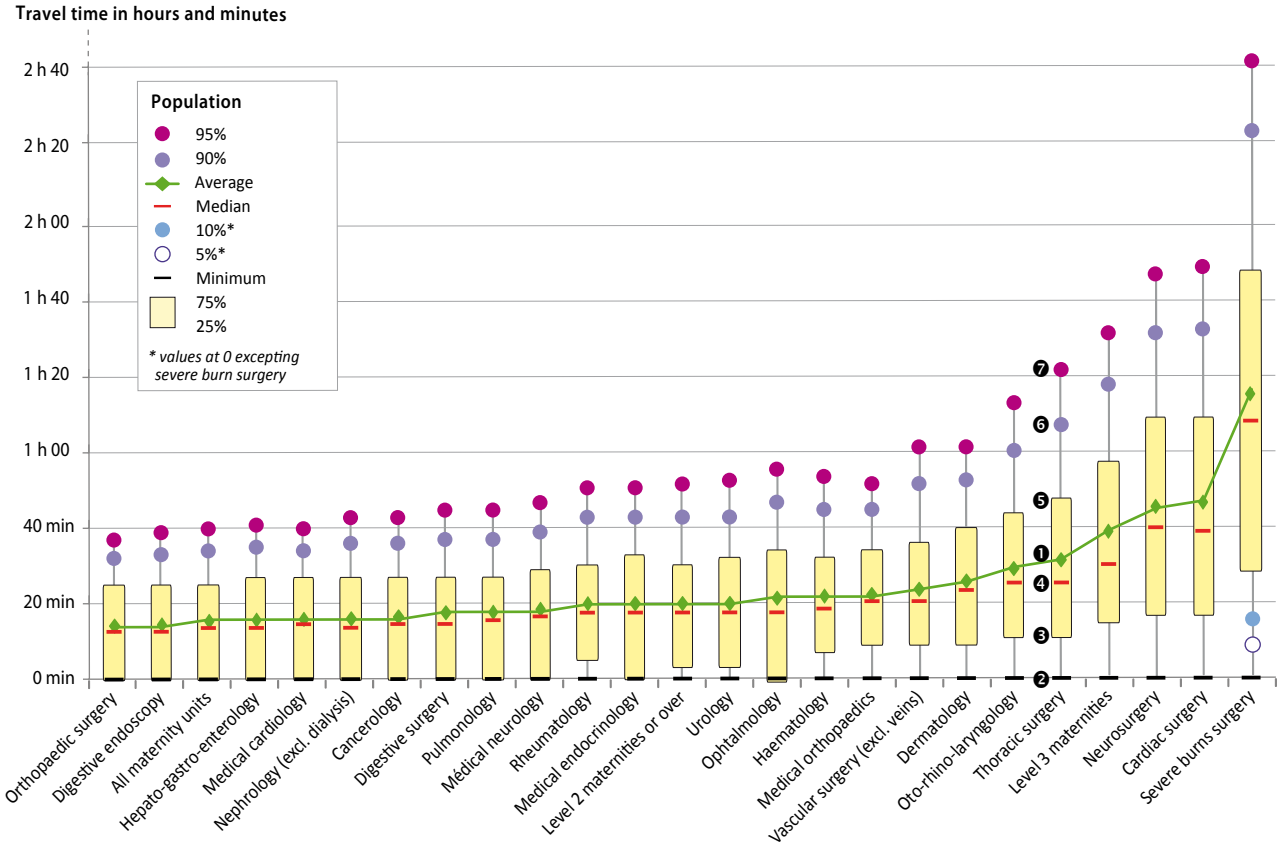
**Field note:** Distribution is truncated in 5% of the longest travel times. The maximum travel time is between 2 h and 2h30 according to speciality.

**Download data in Excel format:** http://www.irdes.fr/EspaceRecherche/Qes/Qes164/DistanceTempsAccesSoins.xls

**Sources:** Cnamts, Irdes.
**Field:** France métropolitaine.

G2

## Distribution of travel times to different hospital specialities on January 1st 2007




**Reading guide**: On average, the French population must count 30 min travel time ❶ to reach the nearest thoracic surgery service. Travel times to this speciality vary from 0 min ❷, for inhabitants living in a municipality where the service is available to over 3 hours for populations at the greatest distance. A quarter of the population is situated at less than 12 min ❸ from a thoracic surgery service, 50% at less than 25 min ❹, 75% at less than 45 min ❺. But 10% of the population has to travel for over 1 hour ❻, and 5% over1h20 ❼ to reach it..

**Field note**: Data is truncated by 5% at the top end of the distribution. The maximum travel time is 2h30 to access the majority of hospital specialities. It reaches 4H for ophthalmology, vascular and thoracic surgery and neurosurgery and over 10 hours for rarer specialities (cardiac surgery, severe burns surgery and level 3 maternities) to which the population rarely needs to travel by road. .

**Download data in Excel format:** http://www.irdes.fr/EspaceRecherche/Qes/Qes164/DistanceTempsAccesSoins.xls

**Sources:** PMSI, SAE.
**Field:** France métropolitaine.

nature of a patient's area of residence, it is the administrative region that determines the ease of access to sector 1 health professionals. In Île-de-France, for example, the average time necessary to reach a sector 1 practitioner increases for the majority of medical specialities (average travel time multiplied by two for access to cardiologists, hepato-gastroenterologists, gynaecologists and pulmonologists). This is equally the case in the Rhone-Alps region notably concerning access to otorhinolaryngologists and urologists.

### Longer travel times to hospital services notably in Corsica and the Limousin region

Regions affected by the longest travel distances to hospital care vary according to hospital speciality. Certain regions, however, appear to be affected whatever the speciality: Champagne-Ardenne, Burgundy, Franche-Comté, Midi-Pyrénées, Auvergne, Limousin and Corsica. In the case of maternity units, if only 2% of women aged from 15 to 49 years old are situated at over 45 minutes by road from a maternity unit, this percentage reaches 31% in Corsica and remains high in Limousin (11%), Franche-Comté (8%) and the Poitou-Charentes (7%) regions. Regarding level 3 maternity units dealing with high risk pregnancies, if overall 94% of French women have access in less than 1 hour 30 minutes, this is the case for only 83% of women in Auvergne, 81% in the Midi-Pyrénées, 73% in Burgundy, 65% in Poitou-Charentes and 0% in Corsica (map 2). In the case of orthopaedic surgery services, answering to a high level of demand both for emergency care (accidents…) and planned care, the percentage of the population living at distances requiring over 45 minutes travel time is low but varies by 1 to 3 according to region: 2% on average but 5% in Auvergne and 7% in Franche-Comté and Limousin. At the other extreme, highly technical hospital disciplines such as thoracic and heart surgery or severe burns surgery are on average situated at greater distances from the population (graph 2). This remoteness must, however, be put into perspective. In emergencies, adapted health service transport (helicopters) is available to transfer patients to a hospital able to provide immediate care which is not necessarily the nearest hospital in geographical terms.

## Since 1990, travel distances to care have evolved differently according to medical speciality

The average distance travelled to access[7] ambulatory care has progressively decreased for eight specialities or private practice professions thus continuing the trend towards shorter travel distances apparent since 1982 (Tonnellier and Lucas, 1995). Travel distances have, however, increased for eight other health professions and remained stable for nurses and radiologists (table).

### The rarest medical specialists have moved closer to the population

The average road distance to an urologist has decreased significantly. Over the period in question the number of physicians has increased considerably and travel distances reduced by half: from 223 in 1982, to 286 in 1990, and 682 in 2006, in other words, a 2.4 increase between 1990 and 2006. The populations thus confronted with the longest travel distances today are nevertheless much shorter than distances recorded in 2006: for urologists, the threshold for the last decile was over 60 km in 1990 and 32 km in 2006. The average travel distance to reach a dermatologist, pulmonologist, gastroenterologist, cardiologist and rheumatologist have equally decreased but to a lesser degree.

### On average general practitioners have not distanced themselves from the population

The average travel distance to primary care has increased for paediatricians (+7 %), psychiatrists (+6 %) but equally for general practitioners (+7 %), even if the absolute value of the difference remains low: for the latter the travel distance is short (0.6 km) and increases on average by only a few hundred meters. These increases concern between 2% (for GPs) and 10% (for paediatricians) of the population. The travel distances to frequently consulted specialities such as private oto-rhinolaryngologists, dental surgeons and gynaecologist-obstetricians have equally increased by a few points.

### A stable travel distance to radiologists and office-based nursing services despite a significant increase in numbers

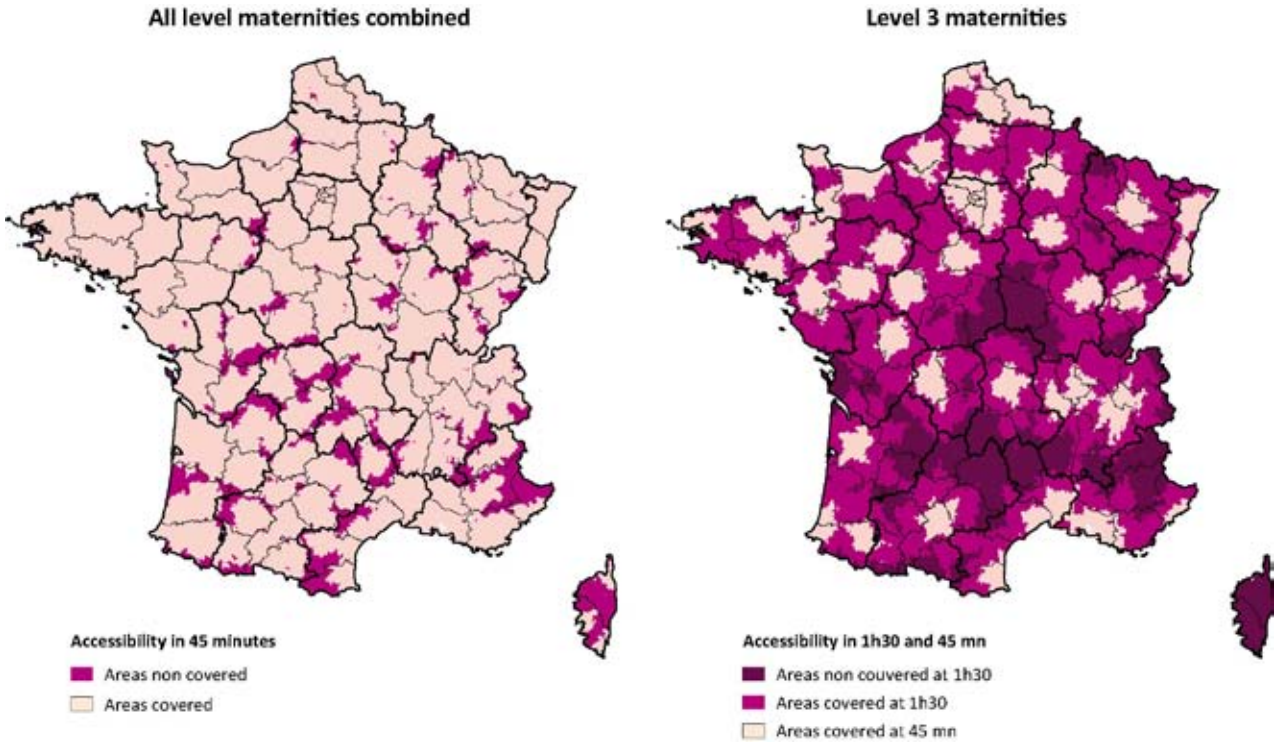
Finally, travel distances to radiologists (6 km on average in 2006) and nurses (0.9 km on average in 2006) have remained stable despite a significant increase in numbers over the period in question (+43% nurses and +28 % radiologists). This is, however, conjugated with a stable or slight increase in the number of regions equipped. This means that these practitioners continue to establish their practices in the same municipalities as in 1990, possibly through the establishment of group practices.

Municipalities in which we observe an increase in the distance travelled to access care have relatively low demographic dynamics with population growth

[7] The travel distances for the year 1990 were calculated as 'crow-fly' distances. 1990-2006 comparisons are thus based on 'crow-fly' distances. The field of analysis concerns private practices only as hospital data sources are too different to measure the changes (for further details see Coldefy *et al.*, 2011).

C2

**Areas covered by maternity units on January 1st 2007**




Sources : Drees, SAE.
Cartographie : Irdes.

**T** Evolution of average 'crow-fly' distances to care in metres between 1990 and 2006 by private health care profession

| | 1990 | 2006 | 1990/2006 | |
|---|---|---|---|---|
| | Average travel distances in metres | Average travel distance in metres | Average evolution of travel distances in % | Probability that travel distances remain the same between 1990 and 2006[a] |
| **Private practice health professions** | | | | |
| General practitioners | 570 | 609 | 6.8 | <0.001 *** |
| Nurses | 740 | 745 | 0.7 | <0.001 *** |
| Dental surgeons | 1,060 | 1,108 | 4.5 | <0.001 *** |
| Physiotherapists | 1,200 | 1,003 | -16.4 | <0.001 *** |
| Ophthalmologists | 4,770 | 4,867 | 2.0 | <0.001 *** |
| Radiologists | 5,000 | 4,978 | -0.4 | 0.2420 |
| Physicians with a specific mode of practice | 5,080 | 4,246 | -16.4 | <0.001 *** |
| Gynaecologist-obstetricians | 5,320 | 5,527 | 3.9 | <0.001 *** |
| Cardiologists | 5,800 | 5,569 | -4.0 | <0.001 *** |
| Psychiatrists and neuropsychiatrists | 6,150 | 6,516 | 6.0 | 0.0042 ** |
| Dermatologists | 6,240 | 5,889 | -5.6 | <0.001 *** |
| Paediatricians | 6,350 | 6,823 | 7.4 | <0.001 *** |
| Otorhinolaryngologists | 6,550 | 6,857 | 4.7 | <0.001 *** |
| Rheumatologists | 7,420 | 7,294 | -1.7 | <0.001 *** |
| Gastroenterologists | 7,430 | 7,086 | -4.6 | <0.001 *** |
| Pulmonologists | 9,220 | 8,701 | -5.6 | <0.001 *** |
| Urologists | 24,900 | 12,320 | -50.5 | <0.001 *** |

[a] According to a student test comparing averages. ***: p<0.001, **: 0.001<p<0.01, *: 0.01<p<0.05

Download data in Excel: http://www.irdes.fr/EspaceRecherche/Qes/Qes164/DistanceTempsAccesSoins.xls

Source: Sniiram.
Field: France métropolitaine.

rates and birth rates below the national average from 1990-2006. According to the urban area zoning established by the INSEE[8], these municipalities are more often situated in isolated rural zones. On the contrary, a high percentage of municipalities situated in suburban rims benefited from a positive evolution in travel distances to care in 2006. Of these, approximately 20% were previously situated in rural zones. The configuration of health care supply appears to follow the rhythm of the health territories' spatial structure and demographic dynamics.

* * *

Even if the spatial access to care is globally satisfactory, the organisation and accessibility of care for individuals situated beyond a reasonable access time or populations with reduced mobility remains an issue. The HSTP law advocates access to health care services and mobility for all throughout the country. The solutions that will enable this goal to be reached have yet to be conceived in a context characterised by two main trends within the health system: encouragement and support for the creation of multi-professional and multi-disciplinary health care practices whilst ensuring the safety and quality of care; two factors that will need to be reconciled with accessibility and an even distribution throughout the country.

This study proposes a national approach. The Regional Health Agencies[9], created in 2010 within the framework of the HSTP law, can use the same basic methodology adapting access time parameters to their specific road networks or local traffic conditions. The problems of geographical accessibility in France currently only concern micro-zones within the country. Specific solutions thus involve decision-making at local level. It should nevertheless be noted that the remotest zones are often situated on regional or departmental boundaries calling for an inter-regional approach.

If the question of spatial accessibility to medical care, defined here in terms of availability (that is to say the presence or absence of a specific service or care supply on the area) is essential, the question requires analysis at different levels. The concept of spatial accessibility would benefit from being enriched by associating physical distance to other supply indicators such as the activity or population ratio of health professionals within the same composite indicator. In this way, the quality of the care supply available could be taken into account in association with physical distance. In addition, the geographical variability in the distribution of sector 2 health professionals (charging in excess of statutory fees), reinforces difficulties in accessing certain specialities and should be taken into account in addition to physicians ratio to population. One can equally associate other health care supply dimensions such as waiting time before obtaining a consultation appointment. Opening times and out-of-hours health care services equally play a role in terms of accessibility. A lack of data, however, makes it impossible to carry out an exhaustive analysis at national level. From

[8] CE's note: Institut national de la statistique et des études économiques.

[9] CE's note: Agences régionales de santé (ARS).

a different standpoint, it is also important to measure accessibility against demand which implies a prior definition of care needs taking into account local data.

This approach should be completed by an analysis of actual distances travelled by the population as patients do not necessarily use the nearest health care services. In order to understand these behaviours, it is essential to better define populations' living environments within the context of increased mobility, but also whether the possibility of using less expensive services (sector 1 versus sector 2) or even a specialist or reputed discipline exist. Do patients bypass nearest care by choice or constraint? Does it respond to local needs? Does it increase inequalities of access? Other dimensions of accessibility such as the patient's social and cultural environment can partly explain the distances actually travelled to access care. Here again, explanatory factors are to be sought on the supply side: difficulties in accessing care may effectively be a combination of spatial and temporal constraints related to opening hours, 'queuing' times as well as added financial difficulties through the lack of care available at regulated fees. These temporal or financial constraints may bring patients to use health professionals or services situated at a greater distance from their home. All these accessibility related dimensions should be explored in order to identify obstacles and differentiate availability, effective access and appropriate access to health care. ♦

## Sources

The data bases available in France to analyse access to care travel distances are multiple and specific to the fields being studied: ambulatory or hospital care.

### Private practice health professionals

Medical demographic data was extracted from the National Health Insurance Cross-schemes Information System (SNIIRAM) on 31st December 2006. This data base registers all private practice health professionals (including full-time hospital practitioners with a private practice activity within the hospital) in activity (even minimal) during the year, resulting in the payment of fees.

In the SNIIRAM data base, private practitioners are counted only once on their national identification number (INSEE code). The totality of a practitioner's activities (all practices combined) is grouped together under the main practice location. Secondary practice locations are thus excluded from the analysis which slightly underestimates our results in terms of private practice supply. Replacement doctors are not identified in the SNIIRAM data base as their activity is registered under the INSEE code of the health professional being replaced.

The majority of private medical practitioners thus identified practice in towns but some may work in health establishments whether they deliver primary care or specialist care.

### Hospital specialities

The FINESS directory (National Directory of Health and Social Establishments) no longer permits the identification of specific specialities since it now only distinguishes medical disciplines by category such as medicine, surgery, obstetrics, psychiatry, follow-up care and rehabilitation…). This loss of information follows the introduction of the law of 31st July 1991 standardising the licensing regime between private and public hospitals. In parallel, albeit included in the French National Hospital data base (PMSI) and the annual health establishment statistics (SAE), that inventory health establishment activities and equipment, hospital services are not listed as such.

It was thus necessary to methodologically identify activities related to these specialities from the different sources available and cross-reference them. The SAE, PMSI data bases and to a lesser degree the FINESS directory were used to identify hospital specialities. The identification of hospital disciplines in health establishments was carried out by retaining a relatively low threshold of activity as the aim was to identify the existence of a service supplied to the population (Coldefy et al., 2011). One could equally envisage retaining higher thresholds of activity which would reduce the number of health establishments selected and increase travel time. The literature teaches us that to date there is no univocal threshold concerning the number of beds, medical acts or admissions guaranteeing the quality of a given type of care and that the relationship between volume of activity and quality of care is still subject to debate concerning certain medical acts.

The specialities subject to inter-regional authorisation (cardiac surgery, severe burns units and neurosurgery) were collected from the General Directorate of Health Care Supply (DGOS). Certain specialities are equally the subject of specific questions in the SAE (maternity levels for example).

### Complex medical equipment

SAE and SNIIRAM data bases were used to identify complex medical equipment (EML). In the SAE, information on existing equipment is collected at geographic level in establishments that have a short-stay activity within full-time hospitalisations. However, EML are frequently shared between several health establishments, legal entities or private practices and private practices equipped with medical imaging equipment are excluded from the SAE as they are not considered as being health establishments. It is for this second reason that the data base was completed with equipment identified in the National Health Insurance reference data base that includes information from CARSAT/CRAM data bases for health establishments that come under the Hospital Law (hospitals, clinics…) and those under the social and medical-social institutions law for which the National Health Insurance intervenes financially. Only licensed equipment in operation in 2006 was retained and travel distances to health establishments using complex medical equipment installed in other health establishments were excluded from the analysis.

## Further information


- Apariccio P., Abdelmajid M., Riva M., Shearmur R. (2008). Comparing Alternative Approaches to Measuring the Geographical Accessibility of Urban Health Services: Distances Types and Aggregation-Error Issues, *International Journal of Health Geographics*, vol. 7, issue 1.
- Barlet M., Fauvet L., Guillaumat-Tailliet F., Olier L. (2010). « Quelles perspectives pour la démographie médicale ? », *La France et ses régions*, édition 2010, Insee.
- Coldefy M., Com-Ruelle L., Lucas-Gabrielli V., Marcoux L. (2011). « Les distances d'accès aux soins en France métropolitaine au 1er janvier 2007 », Drees-Irdes, à paraître. http://www.irdes.fr/EspaceRecherche/BiblioResumeEtSommaire/2011/Rapport1838.htm
- Evain F. (2011). « À quelle distance de chez soi se fait-on hospitaliser ? », Drees, *Études et Résultats* n° 754, février.
- Guerrero D. (2010). « L'accessibilité aux soins de proximité par bassin de vie », Commissariat général au développement durable. Disponible sur : http://www.stats.environnement.developpement-durable.gouv.fr/uploads/media/IDDT_Accessibilitesoins.pdf
- Hillal M., Barret C. (2009). « L'accessibilité aux services par bassin de vie », Commissariat général au développement durable. Disponible sur : http://www.stats.environnement.developpement-durable.gouv.fr/uploads/media/IDDT_accessibiliteservices.pdf
- Tonnellier F., Lucas V. (1995). « Distance d'accès aux soins en 1990 », rapport de l'Irdes n° 1098, Credes.



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