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Accessing Cancer Care: Developments in Cancer Care from 2005 to 2012

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With about 355,000 new cases per year, cancer care is a challenge both in medical and economic terms. Over the last ten years, cancer care went through extensive restructuring, on the one hand under the influence of activity-based funding (Tarification à l'Activité, T2A) as a mode of financing hospitals and, on the other hand, following the implementation of minimal activity thresholds, although it is not yet known what the impacts are in terms of cancer care redistribution, geographical access, and quality of care across the French territory.

The developments in hospital cancer care between 2005 and 2012 are described here, focusing on surgical and chemotherapy facilities. The effects of the reconfiguration of cancer care are examined from the perspective of the evolution of distances of access and admission rates at the *département* level.

Over the studied period, some one hundred facilities that used to perform cancer surgery but with a low level of activity volume have been closed down, while the number of cases per facility increased, notably in the state-owned sector. Despite this, the average distance travelled by patients receiving cancer surgery or chemotherapy did not change much, but variations in admission rates for both of these treatments persist across departments.

One of the next *Issues in Health Economics*, devoted to breast cancer surgery, will provide an analysis of the territorial differences in medical practices, which question equality of access and care quality across *départements*.

With about 355,000 new cases per year, care provision for cancer patients is a challenge both in medical and economic terms. Around three million persons are affected by a form of cancer in France (Inca, 2014). While the likelihood of surviving after a cancer diagnosis is increasingly high thanks to medical progress, cancer remains the primary cause of premature mortality (before 65 years of age), and high social inequality with regard to mortality has been observed (Inca, 2013). The continuous development of new treatments and technologies accounts partly for the increase in survival rates but also raises questions about access to new quality treatments throughout the territory and for all patients. Between 2011 and 2013, health insurance expenditure for cancer care grew much more quickly than the number of patients receiving care (4.3% a year *versus* 0.7%). In 2014, public

Context

This publication is part of a research project financed by the French Public Health Research Institute (Institut de Recherche en Santé Publique,) and developed jointly by the Institut Gustave Roussy, the Institute for Research and Information in Health Economics (Institut de Recherche et Documentation en Économie de la Santé) and the urban-planning centre, Lab'Urba. This project aims to study the impact of cancer regulation policies on healthcare supply, on access, and medical practice.

expenditure linked to cancer exceeded 15 billion euros (Hcaam, 2016), that is to say 10% of national health insurance expenditure (Hcaam, 2016). Most of this expenditure relates to hospital care, followed by expenditure on medicines. Over the last ten years, successive cancer schemes ('Plans cancer') strived to strengthen the quality and safety of cancer care. Moreover, several hospital reforms were introduced to improve the quality and efficiency of cancer care provision throughout the territory. Among them, two are particularly important.

Firstly, as in other therapeutic fields, a policy of concentrating cancer care was implemented, with a view to improving care quality. Since 2009, healthcare facilities have to get specific permission issued by their regional health agency (Agence Régionale de Santé, or ARS) to be authorised to treat cancers by means of surgery, chemotherapy, and radiotherapy. The French Ministry of Health and the National Cancer Institute (Institut National du Cancer, or Inca) defined a number of approval criteria, including minimal activity thresholds per type of treatment. Therefore, the authorisations issued to facilities are subject to a level of minimal activity, namely between 20 and 30 surgical operations a year according to types of cancers; at least 80 patients a year for chemotherapy and at least 600 patients for ambulatory radiotherapy (Inca, 2010). Moreover, the introduction of activity-based funding (T2A) as of 2005 has intensified the competition between healthcare facilities, thereby significantly modified the provision of hospital care. Both of these policies have resulted in a redistribution of cancer care interventions among facilities and across the French territory, but the impacts of this reorganisation in terms of care supply, geographical access and care quality are not known yet.

In this initial *Issues in Health Economics*, we describe the provision of cancer care by studying the evolution of facilities performing cancer surgery and chemotherapy between 2005 and 2012, that is to say before and after the implementation of minimal activity thresholds and the progressive introduction of T2A. Since the recording of radiotherapy treatment in the private sector is incomplete in hospital databases, the analyses focus on surgery and chemotherapy — two major treatments in cancer care. Hence, we will first describe the evolution of the number of facilities offering these treatments and the evolution of activity volumes between 2005 and 2012. We will then examine the effects of reorganisation in cancer care on potential access and utilisation of care across the territory. For this, we compare the evolution of distances run by the patients and admission rates at department level. A future Issues in Health Economics will be devoted to a more detailed analysis of the variations in surgical treatment of breast cancers, over the same period.

The number of facilities performing cancer surgery has decreased while those providing chemotherapy has increased

Between 2005 and 2012, the number of facilities performing cancer surgery dropped from 1,057 to 924 (*i.e.* a reduction of 133 hospitals), while the number of facilities offering chemotherapy grew slightly (+32 hospitals) [see Tables 1 and 2]. These developments reflect a concentration of surgical activities within larger facilities. It is likely that approval criteria for practicing cancer surgery (activity volume and also in situ access to medical imagery techniques, complementary surgery, etc.) are more demanding than those authorising facilities to practice chemotherapy. Moreover, healthcare facilities could be encouraged to keep up and develop chemotherapy activity volume in the competitive context of T2A.

Regarding surgery, Table 1 shows that mostly the smaller private for-profit hospitals that have been affected: between 2005 and 2012, the number of private clinics performing cancer surgery went down by more than 20%, and the number of general public hospitals (Centres Hospitaliers, or CH) by 9%, to the benefit of the private not-for-profit hospitals, whose number rose by 13%. This reduction mainly concerned small clinics (fewer than 100 beds), whose proportion fell from 40% in 2005 to 32% in 2012. Throughout France, 68 departments have been affected by the reorganisation surgical activity, with 61 of them closing 1 to 11 cancer surgery facilities and 7 departments being allocated an additional facility.

As to chemotherapy, the changes in provision mainly concerns the state-owned sector and, in particular, general public hospitals: the number of public facilities providing chemotherapy increased from 218 to 246 between 2005 and 2012 (see Table 2). Over the same period, the number of private for-profit clinics decreased slightly, while the number of private not-for-profit facilities offering chemotherapy rose by 24% (from 37 to 46 facilities).

… with a significant increase in the number of admissions and chemotherapy sessions in public sector

The reduction in the number of hospitals performing cancer surgery was accompanied by an increase in activity volumes in all sectors. While the total number of cancer surgeries grew by 5% between 2005 and 2012, it was mainly state-owned and private not-for-profit hospitals that increased their volumes and market share. In 2012, state-owned hospitals — teaching and general hospitals — performed about 40% of cancer surgeries against 34% in 2005. Despite a slower growth in for-profit sector, private clinics (very numerous in 2012,) are still the major providers of cancer surgery in 2012: 46% of surgeries were performed by private hospitals (as against 54% in 2005).

The trends in in-hospital chemotherapy was much more striking over this period. The number of chemotherapy sessions

Sources and methods

The data used comes from the Hospital episode statistics (Programme de Médicalisation des Systèmes d'Information en Médecine, Chirurgie et Obstétrique, or PMSI-MCO) matched with the Annual Hospital Statistics (Statistique Annuelle des Établissements de Santé, or SAE), in order to identify geographic localisation of facilities. The study was limited to mainland France since issues relating to the choice of care are different in overseas *départements* (*départements* d'outre-mer, or DOM).

Chemotherapy admissions correspond to cases for which the primary diagnosis is a chemotherapy session for a cancer-related tumour and diagnosis. Surgery cases consist of admissions with a cancer as the primary diagnosis.

The characterisation of care provision and estimation of distances travelled required, on the one hand, to locate the cancer facilities where the admission took place and, on the other hand, the patients' municipalities of residence. The geographical location of health facilities was identified t by matching PMSI with SAE that comprises several variables — such as the number of full-time equivalent oncologists and cancer specialist surgeons as well as the number of chemotherapy visits — that made it possible to identify those facilities, listed under the same legal entity, with a cancer ward. The addresses of facilities were obtained from the FINESS database. In order to focus uniquely on the facilities providing cancer care, the 'extreme' facilities have been excluded from our analyses (less than 20 surgeries and 300 chemotherapy sessions per year, all cancers included).

To calculate travel distances to hospital, patients' residence codes, which are registered in the form of postal codes or PMSI codes developed by the Technical Agency for Information on Hospitalisation (in the PMSI, have been turned into INSEE (National Institute of Statistics and Economic Studies) codes. The distances travelled by patients are calculated by the Odomatrix distance calculator and correspond to the distance by the road in kilometres between the municipality of patients' residence and that where the hospital is located.

T1

Number and volume of facilities providing cancer surgery by type of facility in 2005 and 2012

	Distribution of facilities				Distribution of surgery cases			
	2005		2012		2005		2012	
	Numbers	%	Numbers	%	Numbers	%	Numbers	%
State-owned sector								
General public hospital	322	30.5	293	31.7	62,424	15.7	73,465	17.6
Regional Teaching Hospital	87	8.2	88	9.5	74,545	18.7	89,087	21.3
Private sector								
Cancer Centre	20	1.9	20	2.2	26,334	6.6	31,034	7.4
Private for-profit	561	53.1	447	48.4	213,786	53.6	192,107	46
Private not-for-profit	67	6.3	76	8.2	21,385	5.4	32,134	7.7
Total	1,057	100	924	100	398,474	100	417,827	100

Sources: PMSI MCO, SAE (2005, 2012).
Scope: Hospitals performing at least 20 surgical operations, all cancer cases included.
Note: The hospitals are identified by their geographical entity.
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T2

Number and volume of facilities providing chemotherapy by type of facility in 2005 and 2012

	Distribution of facilities				Distribution of chemotherapy sessions			
	2005		2012		2005		2012	
	Numbers	%	Numbers	%	Numbers	%	Numbers	%
State-owned sector								
General public hospital	218	41.3	246	43.9	346,193	24.9	644,995	29.2
Regional Teaching Hospital	77	14.6	78	13.9	261,767	18.8	472,166	21.3
Private sector								
Cancer Centre	20	3.8	20	3.6	212,985	15.3	333,087	15.1
Private for-profit	176	33.3	170	30.4	508,965	36.6	624,879	28.2
Private not-for-profit	37	7	46	8.2	60,957	4.4	136,858	6.2
Total	528	100	560	100	1,390,867	100	2,211,985	100

Sources: PMSI MCO, SAE (2005, 2012).
Scope: Hospitals performing over 300 chemotherapy sessions annually.
Note: Hospitals are identified by their geographical entities.
Download the data

grew by about 60% in seven years. Table 2 shows that this evolution was mainly linked to an increase in activity in public hospitals, in which the number of sessions doubled, while their market share rose from 43 to 50% between 2005 and 2012. Conversely, private hospitals' market shares went down from 37% to 28% over the same period. The increase in chemotherapy sessions is not only linked to the increase in the number of patients receiving this type of treatment but also to the increase in the number of sessions per patient. Between 2005 and 2012, the number of chemotherapy sessions per patient rose from 6.6 to 8.2, while the number of patients treated by chemotherapy grew from 202,736 to 269,403. The rise in the incidence of certain cancers (notably prostate cancer, and breast and lung cancers in women) and the emergence of new molecules over that period (some of which were administered over a long period) could partly account for the considerable increase in the number of chemotherapy sessions. Nevertheless, the significant variations accross territories raise questions.

Access distances were little affected by the reorganisation of cancer care

The increase in activity volumes with a reduction in the number of facilities performing cancer surgery meant higher market concentration (reduction in the number of healthcare suppliers in a territory), which might impact access to care. The assessment of distances travelled by patients admitted for surgery and chemotherapy in 2012 (in comparison with 2005) tends to show that, at national and department levels, distances have not changed much.

For cancer surgery on a national scale, the mean distance travelled by patients increased by two kilometres between 2005 and 2012, rising from 25 to 27 kilometres. As cancer surgeries are most often elective interventions, the impact of such an increase in travel distance can be limited. At department level, distances increased in two thirds of departments but the increase is low, below 3 kilometres on average. While the mean distance travelled in departments in the top tenth decile increased slightly, from 44 to 47.3 kilometres, variations (standard deviation and scope) among departments remained the same. Indeed, the distance rose slightly in departments where the average distance was the shortest. On the whole, the cartography of travel distances for cancer care remained unchanged between 2005 and 2012: departments where the distances were the longest in 2005 and in 2012 were the same (see Map 1).

For chemotherapy, the mean distance travelled by patients remained mostly stable and reached 25 kilometres. In 70% of departments, the mileage travelled by patients varied slightly (a difference of around 3 kilometres or less) and, in seven departments, distance was shortened by more than 5 kilometres and even — in two of them (the Lozère and Corrèze *départements*) — by more than 10 kilometres. Furthermore, between 2005 and 2012, variations across *départements* (standard deviation and decile ratio) diminished slightly. However, given that chemotherapy treatment requires repeated visits to hospital, travel distances may be of concern in some *départements* or in some municipalities. For example, in 2012, the mean distance travelled to attend chemotherapy sessions was more than 35 kilometres in fourteen *départements*, or even more than 45 kilometres in three of them (the Ariège, Orne, and Gers *départements*) [Map 2].

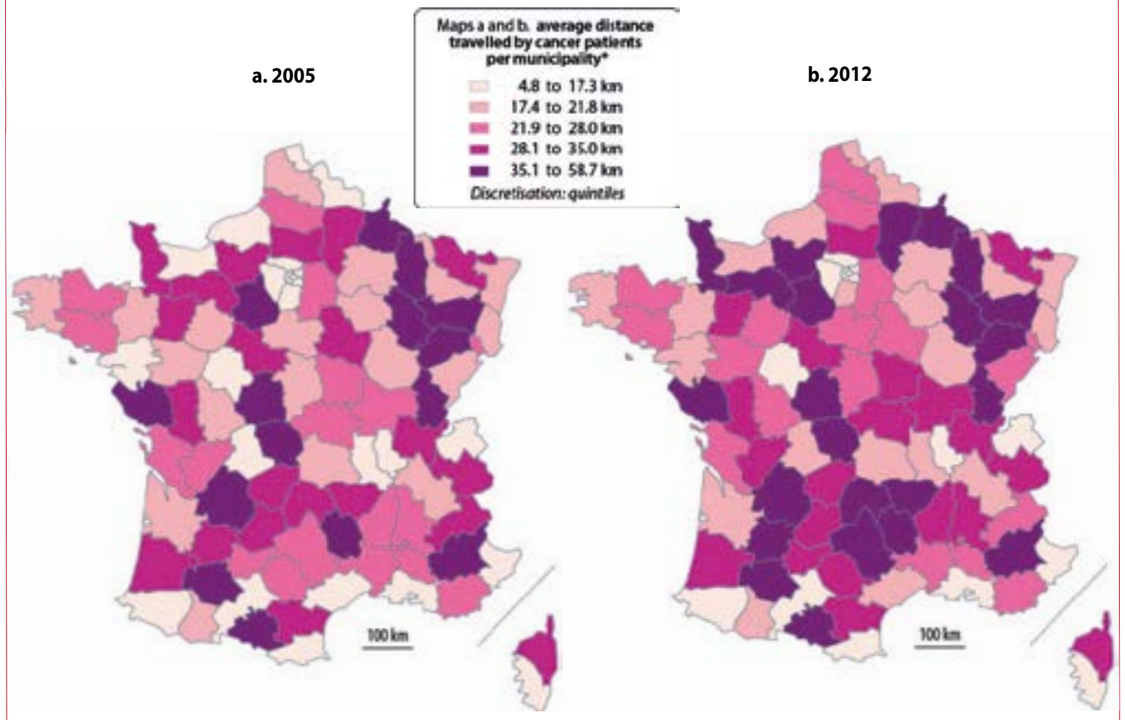
Admission rates for cancer surgery and chemotherapy varied significantly across *départements*

In order to describe the variations in cancer treatments we compared the evolution of admission rates for cancer surgery and chemotherapy at the *département* level. The admission rates report the number of hospital cases or sessions per population according to patients' places of residence (and not according to the *département* where treatment is given). The rates are standardised to remove the effect of differences in age structure of the population in a *département* compared with the national population. The standardisation does not correct for epidemiological differences (incidence of cancers), hence the territorial differences may partly reflect the differences in local population's health status. But they also reflect the disparities in local capacities of prevention and screening and the variations in cancer care treatments across *départements*. Studies from abroad and in France show that medical practices in cancer treatment (the decision to have surgery and chemotherapy, as well as the type and place of treatment) can be linked to the availability of hospital care and alternative forms of care (Corralo *et al.* 2014; Richardson *et al.* 2015; Or and Verboux, 2015).

At national level, the average standardised rate of admission for cancer surgery remained stable between 2005 and 2012,

M1

Distances travelled for cancer surgery in 2005 and 2012



Descriptive statistics (Km)

Years	Minimum	Maximum	Average	Mean	Standard deviation	Ratio P90/P10
2005	4.9	57.9	24.5	22.6	10.1	0.2
2012	5.5	58.7	26.4	24.7	10.7	0.2

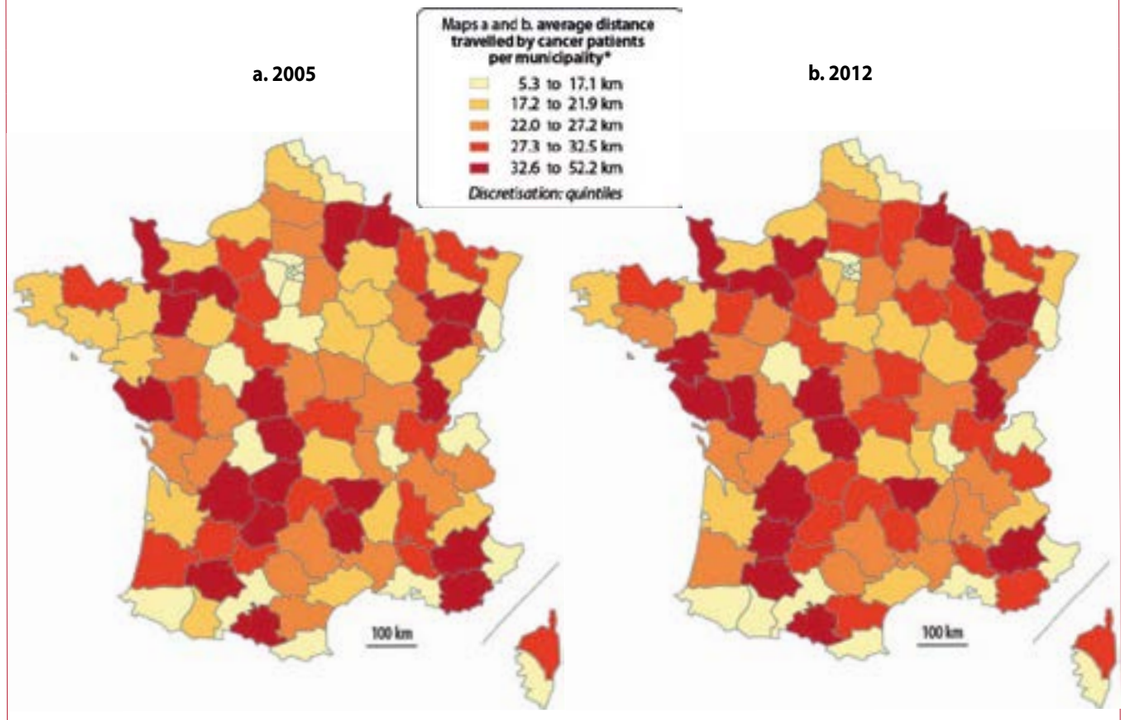
* Distance in kilometres by car between patients' places of residence and those of municipalities where hospitals are located.

Sources: PMSI MCO, SAE (2005, 2012).

Download the data

M2

Distances travelled for chemotherapy treatment in 2005 and 2012



Descriptive statistics (Km)

Years	Minimum	Maximum	Average	Mean	Standard deviation	Ratio P90/P10
2005	5.3	52.2	25.4	24.6	10.0	2.8
2012	5.9	50.7	25.6	25.3	9.2	2.5

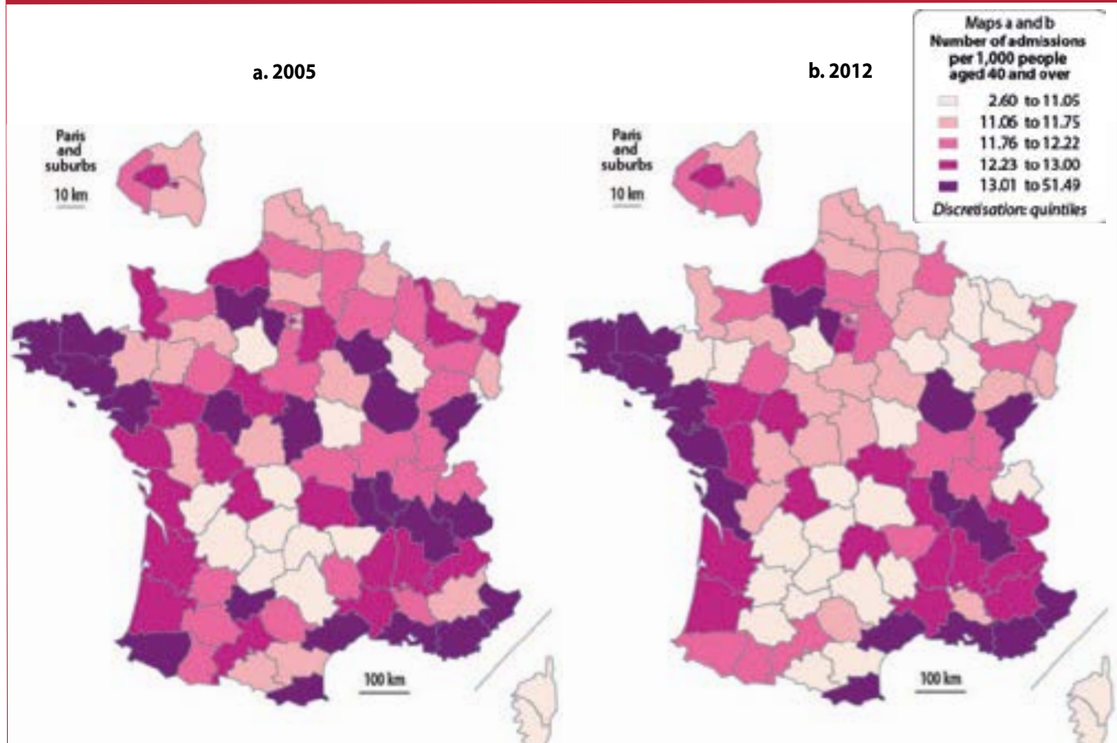
* Distance in kilometres by car between the patients' places of residence and those of municipalities where hospitals are located.

Sources: PMSI MCO, SAE (2005, 2012).

Download the data

M3

Cancer surgery admission rates in 2005 and 2012



Descriptive statistics (rate per 1,000 people aged 40 and over)

Years	Minimum	Maximum	Average	Mean	Standard deviation	Ratio P90/P10
2005	2,6	51,5	11,8	12,9	5,9	1,31
2012	2,8	42,7	12,1	12,5	5,3	1,31

Sources: PMSI MCO, SAE (2005, 2012).

Download the data

with 12 surgeries per 1,000 patients aged 40 years and over. In spite of considerable variations between departments, the extent of inter-department variations diminished (differences between upper and lower deciles: see Maps 3 and 4) over this period.

Regarding chemotherapy, the average admission rate grew from 45 per 1,000 patients aged 40 or over in 2005 to 68 in 2012. While there was a slight reduction in inter-department variations over this period, in 2012, the admission rates for chemotherapy varied from less than 25 in Corsica to more than 230 in the Côte d'Or and Côtes d'Armor regions. The significant differences between the *départements* may indicate the differences in cancer incidence and preferences of patients and clinicians, but also they show the diversity of medical practice in different cancer care facilities. With regard to the utilisation of in-hospital chemotherapy, differences may partly reflect distinct therapeutic strategies (more or less frequent utilisation of targeted oral therapy for certain cancers) and the level of development of alternatives to hospital, such as home hospitalisation. It is important to grasp the determinants of these variations and analyse the situations in departments where admission rates are either very low or very high.

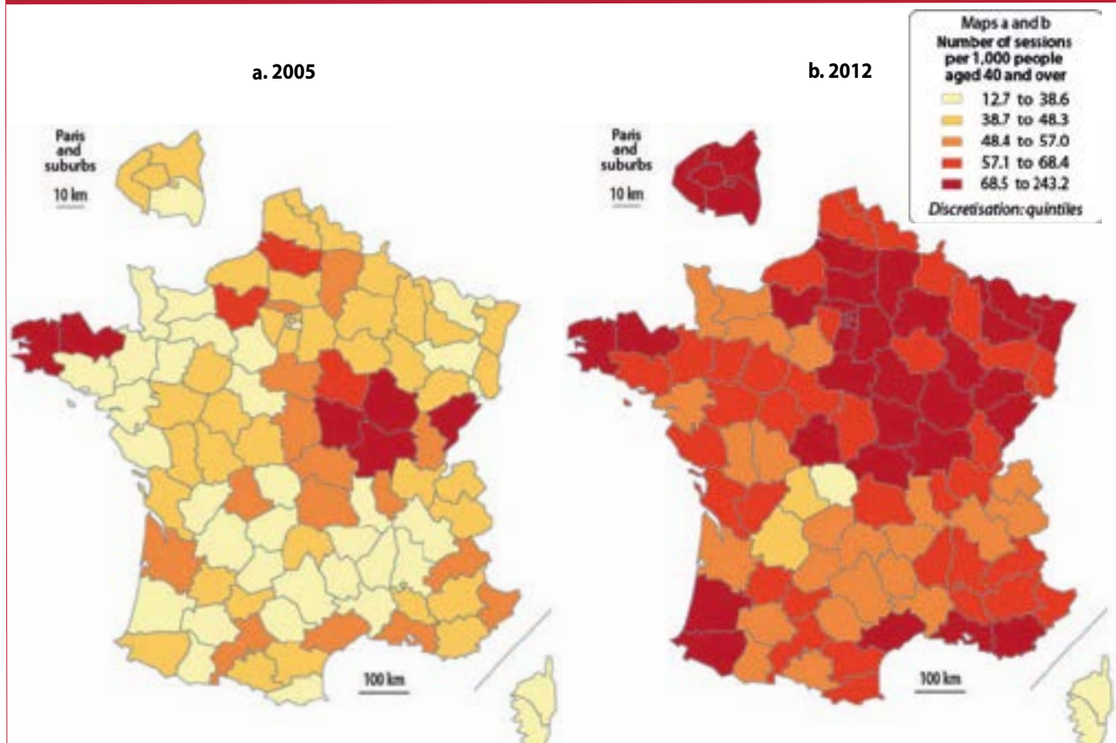
* * *

Between 2005 and 2012, there were significant changes in the provision of cancer care. The introduction of minimal activity thresholds and T2A were accompanied by the closing down of about a hundred surgical cancer facilities with low activity volumes, predominantly from the private for-profit sector. At the same time, the average volume of cases per facility was increased with the concentration of the provision of cancer care. While the analysis of distances travelled to access cancer surgery shows that these conversions had little impact on patients, the distances travelled to receive chemotherapy treatment (requiring many visits to a hospital) may be a cause of concern in some *départements* and municipalities in 2012.

Moreover, this study highlights significant variations in admission rates for cancer surgery and in-hospital chemotherapy between *départements* even if the increase in chemotherapy treatments is a global phenomenon, partly attributable to an increase in incidence of some cancers and to the emergence of new molecules during the study period. Variations across *départements* in the admission rates of surgery and chemotherapy, which

M4

Chemotherapy utilisation rates in 2005 and 2012



Descriptive statistics (rate per 1,000 people aged 40 and over)

Years	Minimum	Maximum	Average	Mean	Standard deviation	Ratio P90/P10
2005	12,7	171,4	45,4	41,9	23,8	1,80
2012	14,2	243,2	67,6	63,0	32,7	1,49

Sources: PMSI MCO, SAE (2005, 2012).

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partly reflect differences in prevention, screening, and cancer care capacities of regions, raise questions about possible inequalities in cancer treatment according to patients' places of residence as well as about variations inquality and efficacy of the care provided.

It remains to be seen whether, in fine, the policies regulating hospital supply have improved the quality of cancer care: what are the consequences of reorganisation of care supply on patients' care quality? Does the concentration of cancer surgery induced by the new authorisation scheme lead to an improvement in surgical practices and to a reduction of variations in practice across territories? This will be the focus of a future issue of *Issues in Health Economics* concentrating on breast cancer surgery. ♦

FOR FURTHER INFORMATION

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