In 2015, breast cancer was the most common form of cancer suffered by women in France in terms of incidence (54,000 new cases) and mortality (12,000 deaths) [Inca, 2015]. The surgical treatment of breast cancers has improved due to developments in diagnoses and therapies, as well as the reconfiguration of cancer care provision. Conservative surgery (tumorectomy) became the principal treatment in more than 70% of the cases in the vast majority of hospitals in 2012. Between 2005 and 2012, the sentinel lymph node biopsy technique was offered in most of the healthcare facilities, and the number of patients who underwent this treatment tripled over the period. However, immediate breast reconstruction (IBR) after a total or radical mastectomy was still relatively rare, despite an increase in the number of instances where this technique was used.

The implementation of these practices varied between hospitals and départements. These variations may partly be linked to patients’ health status and their preferences. But they also attest to differences in the organisation of services and the availability of technical platforms, as well as differences in medical practices between hospitals. All things being equal, the probability of benefitting from the sentinel lymph node technique or immediate breast reconstruction is greater in the Cancer Centres (Centres de Lutte Contre le Cancer, or CLCC), the Regional Teaching Hospitals (Centres Hospitaliers Régionaux, or CHR), and in hospitals with a high patient volume.

Cancer is the primary cause of death in France and the incidence rates for cancer continue to increase, particularly for women. However, cancer mortality rates (all locations combined) are dropping due to the implementation of prevention, detection, and diagnostic programmes and therapeutic developments. For certain cancers, the treatment options are increasing. The information on the available treatments and their geographic accessibility within France is particularly useful, both for the patients and their families and for the health professionals and policy makers.

In France, the 2014–2019 Cancer Plan aims to accelerate the dissemination of innovations for patients and enable each person in France to receive the same quality of treatment (2014–2019 Cancer Plan, 2015). Yet, relatively little information is available about the variations in cancer treatment practices in France. Cancer care market have been modified substantially over recent years, on the one hand due to the introduction of Activity-based Funding (Tarification à l’Activité, or T2A) as a means of funding hospitals and, on the other, after the implementation of minimal activity thresholds specific to cancer in order to have the authorisation to practise different activi-
Breast cancer treatment varies over time in France. Variations in surgical practices in breast cancer treatment in France are influenced by regulatory policies and medical practices. The absence of a national standard for breast cancer treatment and the distance travelled by patients to receive treatment may be linked to the dissuasive pricing of breast cancer surgery. This practice was linked to the distribution of breast cancer surgery facilities.

The concentration of breast cancer surgery market was assessed by a wider dissemination of these interventions. Between 2005 and 2012, the number of breast cancer surgery admissions increased by 13%, with a greater increase in conservative surgery (+16%) and a more moderate increase in mastectomies (+4%). Over the same period, a third of the facilities carrying out breast cancer surgery no longer did so in 2012 (526 hospitals in 2012 versus 804 in 2005). The reconfiguration of cancer care market was particularly marked in the private for-profit sector, with a 40% reduction in private facilities carrying out breast cancer surgery. In terms of volume of activity, the median income in the patients' town or city of residence. In addition, included certain clinical characteristics: the type of surgery for the SLNB (complete mastectomy), and the practice of axillary lymph node dissection and chemotherapy treatment for the BR. With regard to the hospital, aside from the hospital category, we included the activity volume (number of surgical interventions for breast cancer per year).

The reconfiguration of breast cancer surgery market (provision) did not have any marked effects on the activities carried out by the patients who underwent a mastectomy. Between 2005 and 2012, the average distance travelled by patients changed little.
one kilometre (from 21.2 to 22.4 kilometres) and remained stable in two thirds of the departments.

However, the dissemination of the sentinel lymph node technique was accompanied by a significant decrease in the distances travelled by the patients. On a national scale, the journeys to receive this treatment decreased by four kilometres between 2005 and 2012. At the department level, the distances decreased on a nationwide scale and, in particular, in the regions where the distances were greater (the average distance for the departments in the last decile decreased from 88 to 69 kilometres).

Regional disparities in conservative surgery rates persist

Although the number of patients undergoing conservative surgery increased from 69.7% to 71.4% on the national level, in 2012 the percentages varied from 56% in the Vosges region to more than 83% in southern Corsica, depending on the patient’s place of residence (Map 1). Between 2005 and 2012, the disparities between departments remained stable, but the variation in 2012 was still significant: on the department level, the percentages of patients (diagnosed with breast cancer) undergoing conservative surgery varied between 52% and 84% depending on their place of residence. In these analyses, the rates of tumorectomy for women operated for breast cancer was calculated from the point of view of the patients, by calculating the rates in relation to their place of residence rather than the department where the treatment was provided (see Sources and Methods inset). The regional disparities observed may reflect differences in capacities for prevention and diagnosis (advanced or multiple tumours requiring a mastectomy), as well as variations in surgical practices. Mainly the departments located to the north of the Loire, and, in particular, several departments in the north-east and south of Normandy had the lowest number of tumorectomies.

Regional variations in the use of sentinel lymph node biopsy were attenuated in 2012, but remained significant

Between 2005 and 2012, the dissemination of the sentinel lymph node technique — particularly in public hospitals (C31) and private for-profit facilities — attenuated the regional variations in the use of this technique. In 2012, patients suffering from breast cancer were far more likely to benefit from the sentinel lymph node technique than in 2005, wherever their place of residence: on the national level, the percentage of patients who benefitted from this intervention varied from 13% in the Hautes-Pyrénées and 23% in the Marne to more than 62% in the Jura, Loire, and Haute-Saône regions. The regional disparities in the application of the sentinel lymph node biopsy should be taken by caution, because some of the variations observed might be linked to differences in coding practices in the different facilities that use the sentinel lymph node technique. Nevertheless, the extent of the variations between departments raises questions.

While it is difficult — and even impossible — to establish the appropriate levels for the use of each practice, the extreme (very low) rates should be questioned. In these analyses, we are interested in the extent of the regional variations.

Marked differences between the north and south of France with regard to immediate breast reconstruction

The trends in practice of immediate breast reconstruction was not uniform throughout France. There were disparities along a north-west/south-east ‘fault line’ that extended from Saint-Malo to Nice (see Map 3). In most of the departments located south of this axis, the proportion of women who had immediate breast reconstruction was high (over 20%), while several of the same departments had some of the lowest levels of this practice in 2005. However, in most of departments located north of this axis, the proportion of women undergoing this surgery rarely exceeded 9%, with the notable exception of Paris. These regional variations may be linked to differences in surgical practices used in the different types of facilities: on the level of the departments, the presence (or not) of facilities that practised immediate breast reconstruction had an impact on the number of cases of immediate breast reconstruction in the department. Therefore, regional differences in the practice reflect also the inequalities in treatment for women depending on the region where they live.
Variations in surgical practices in breast cancer treatment in France

In 2005 and 2012, the rate of sentinel lymph node biopsy was significantly higher in cancer centres and regional teaching hospitals compared to other categories of hospitals. Immediate breast reconstruction was more frequent at tertiary centres, and less so at general public hospitals (CH). This descriptive approach is, however, insufficient, because it does not take into account any potential differences in patient characteristics in different hospitals. In order to ascertain whether the probability of undergoing a sentinel lymph node biopsy or an AIB depends on the characteristics of the healthcare facilities in which the patients are treated, we specified multilevel logistic models controlling simultaneously for the characteristics of patients and hospitals (see inset p. 5). The results of this modelling, presented in Table 2, show that, controlling for observable clinical characteristics, the probability of having an immediate reconstruction decreased with age (as of 50) and that women living in less affluent neighbourhoods were less likely to undergo this intervention. The effect of age in 2005 was still significant, but less pronounced in 2012 compared with all the other categories of hospitals. In 2005, when this practice was not yet relatively uncommon, the probability of receiving an immediate reconstruction after a mastectomy was twice as high in a cancer centre as in a private clinic. This also reflects a greater heterogeneity in this practice in public facilities, as only a few hospitals offer an immediate reconstruction after a mastectomy. Hence, in 2012, patient characteristics in different healthcare facilities were more homogenous. The greater the interval (IIQ) measures the variation within a category could be significant. Hence the treatment is more likely to be delayed in patients at more advanced stages of their cancer; that the Cancer Centres treated patients (75%), this may be explained by the fact that the Cancer Centres treated patients at more advanced stages of their cancer, hence the treatment is more likely to be delayed. For immediate breast reconstruction, the situation was yet relatively uncommon. For immediate breast reconstruction, the situation was yet relatively uncommon. For immediate breast reconstruction, the situation was yet relatively uncommon. For immediate breast reconstruction, the situation was yet relatively uncommon. For immediate breast reconstruction, the situation was yet relatively uncommon. For immediate breast reconstruction, the situation was yet relatively uncommon. For immediate breast reconstruction, the situation was yet relatively uncommon.

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cancer surgery patient volumes of the hospital in which the patient was treated. For instance, the probability of having an IBR was twice as high in the hospitals that carried out more than 110 cases of breast cancer surgery per year compared with hospitals that practised between 50 and 110 surgical interventions.

The analysis of the progress in the use of three surgical procedures for breast cancer treatment shows that surgical practices changed greatly between 2005 and 2012. The rates of conservative treatments increased, while the practice of the sentinel lymph node biopsy, which is less invasive than axillary lymph node dissection, was disseminated in most of the hospitals. Immediate reconstruction after a mastectomy was still relatively infrequent in 2012, despite the increase in the number of women who underwent this intervention (+25%). The low rates of immediate breast reconstruction, compared with North-American countries (Zhong and al., 2014), may be linked to the dissuasive payment of this practice in France. Until 2011, mastectomies with or without immediate reconstruction were remunerated at the same rate in the healthcare facilities.

Despite the dissemination of these interventions between 2005 and 2012, the use of these procedures varies across hospitals and départements (regions). The regional disparities in the practice of these three interventions suggest that the likelihood of benefitting from these treatments varied according to the patients’ place of residence. These differences may partly reflect patients’ health status and preferences. They may also reveal the variations in healthcare supply, and in availability of technical platforms and surgeons, as well as their medical practices. For instance, the chances of having immediate breast reconstruction, which requires the dual skills of an oncology surgeon and plastic surgeon, will be greater for patients who live near departments holding healthcare facilities that provide this kind of treatment. About the number of tumorectomies, regional disparities may also reflect differences in the local capacities for screening and diagnosis (advanced tumours most often require a mastectomy). The availability of adjuvant treatments and their cost for the patients in terms of non-reimbursed expenditure and access times (distances) may also be factors that influence the decision to carry out conservative surgery rather than a mastectomy.

Variations observed in the practice of these interventions were also largely related to the configuration of the cancer treatment services because the practices varied according to hospital categories. The Cancer Centres (CLCC), followed by the Regional Teaching Hospitals, were distinguished by higher rates of the interventions studied (except for conservative surgery in the CLCC), as were hospitals with a high volume of activity. At the same time, significant variations within the different categories of hospitals (intra-category disparities) suggest that there are scopes for progress. In cancer care, the treatment is multidisciplinary, but the surgeons play an important role in managing most of the decisions. The variations observed with regard to the hospitals may indicate that the surgeons work in different environments and have preferences that may vary according to local culture and practices.

Our analyses have highlighted the existence of inequalities in surgical breast cancer treatments. Surgical practices vary across hospitals and by the volume of activity. While the policy of introducing minimal activity thresholds is fully justified, it is equally important to inform patients and health professionals about the variations in existing practices to improve the care quality and to ensure that everyone has the same treatment opportunities throughout France.