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## Geographical distribution of multi-professional group practice structures ("*maisons*" and "*pôles de santé*") and its impact on private general practitioner density

Second part of the evaluation of "*maisons*", "*pôles*" and "*centres de santé*" within the framework of experiments with new mechanisms of remuneration (ENMR)

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Are multi-professional group practice structures "*maisons de santé*" (MS) and "*pôles de santé*" (PS) established in areas where the provision of healthcare services has become fragile and care needs important? Has the development of these healthcare structures had an impact on general practitioner density? This second publication on the evaluation of multi-professional group practices participating in experiments with new mechanisms of remuneration (ENMR) deals with both questions. It concerns sites identified by the Observatory of Health Service Supply Re-structuring, analysed by means of two typologies constructed from social, economic and health situations within the French national territory; the first in predominantly rural areas and the second in predominantly urban areas. The resulting "*living areas*" and "*pseudo cantons*" thus defined, are then used to compare general practitioner (GP) density over two consecutive periods, 2004-2008 and 2008-2011, according to whether the area concerned hosts a multi-professional group practice (MS) or not.

Over the last decade or so, the public authorities have encouraged the development of multi-professional group practices in primary care, and notably health centres of the type "*maisons de santé*" (MS) or "*pôles de santé*" (PS). In the previous edition of Issues in Health Economics devoted to this subject, we presented the aims of the study and the methodology used to evaluate the impact of multi-professional group practices based

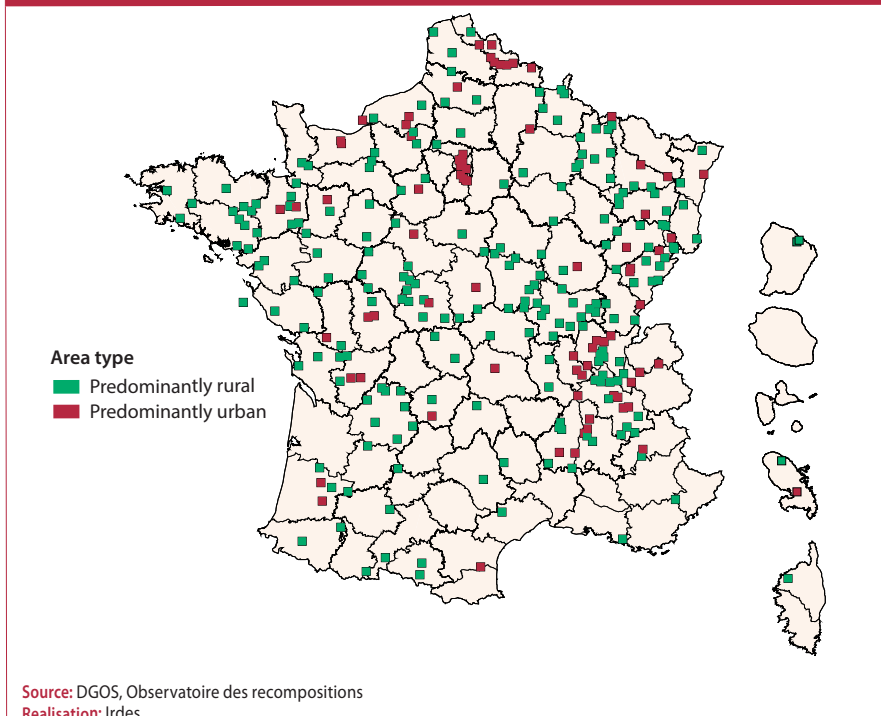
on sites identified by the Observatory of Health Service Supply Re-structuring (*Observatoire des recompositions de l'offre de soins*) or those participating in experiments with new mechanisms of remuneration (ENMR) (Afrite *et al.*, 2013). This second part in a series on evaluation results (Chevillard *et al.*, 2013) provides information on the geographical distribution of MS according to the social, economic and health characteristics of the areas in which

they are located (Context p. 2). This study aims to reveal initial trends in the supply of general practitioners following the development of MS and PS.

Two main questions are examined: are "*maisons de santé*" established in areas where healthcare supply is tenuous and

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C1

**"Maisons de santé" in operation on January 1<sup>st</sup> 2013 according to area type****METHOD**

Two types of statistical analysis were conducted; principal components correspondence analysis (PCA) and the bottom-up method of hierarchical classifications used to identify six classes of predominantly rural living areas and seven classes of predominantly urban "pseudo-cantons". The PCA distinguishes healthcare service resource levels and different social characteristics comprising (for predominantly urban "pseudo cantons"), 29 active variables and 31 descriptive variables for 2,189 individuals; and for the predominantly rural living areas, 28 active variables and 32 descriptive variables for 1,416 individuals.

**Indicators used to elaborate the typologies**

The typologies elaborated within the framework of this analysis are based on several factors (Chevallard *et al.*, 2013). The choice of these factors and the indicators making up the typology allow us to test the hypothesis according to which "maisons de santé" are established in certain types of area that are more fragile in terms of healthcare supply, care needs and geographical location. Three categories of indicators were retained:

- **Indicators concerning healthcare supply:** Local potential accessibility (LPA), density, trends in the population density of private general practitioners (attractiveness), age structure of private general practitioners...
- **Indicators concerning the population:** demographic trends (attractiveness), age structure, socio-professional categories, income, education, unemployment level, health status (life expectancy, premature mortality rates, avoidable mortality related to the health system)...
- **Indicators concerning spatial structure:** distribution of the population according to type of area (urban centre, semi-urban ring), distance to healthcare services.

**Definitions of rural and urban areas**

So as to distinguish predominantly rural and urban areas, we defined predominantly urban areas as living areas in which the polarising centre is a major urban centre<sup>1</sup>, the remaining living areas being considered as predominantly rural (Chevallard *et al.*, 2013). The "living area" is the smallest territory on which inhabitants have access to the most common facilities and services (Brutel, 2012). To describe the environment in which urban "maisons de santé" are established and to acquire a finer level of analysis than the living area, we chose the "pseudo-canton". It consists of one or more entire municipalities grouped together to form the "pseudo-canton".

Thus defined, the predominantly urban area groups together two thirds of the population in metropolitan France, and the remaining third in predominantly rural areas.

<sup>1</sup> Urban area zoning (*Zonage en aire urbaine, ZAU*) elaborated by the INSEE distinguishes major urban centres (over 10,000 jobs) average urban centres (between 5,000 and 10,000 jobs) and small urban clusters (between 1,500 and 5,000 jobs), the zones under their influence in which over 40% of the active resident population travel into the urban centre (urban periphery and multipolar municipalities), and isolated areas outside the influence of the urban centre...

**CONTEXT**

Experiments with new mechanisms of remuneration (ENMR) aimed at 'maisons de santé' 'pôles de santé' and 'centres de santé' were implemented in 2010. Its aim is to fund improvements in the organisation and coordination of care, offer a new range of services to patients and develop multi-professional group practices. The evaluation of experiments with new mechanisms of remuneration is carried out by IRDES within the framework of its partnership with the Prosper team whose main line of research concerns group medical practices. This article, based on a more in-depth analysis, (Chevallard *et al.*, 2013) is the second in a series of future publications presenting results. The first publication presented evaluation objectives and general methodology (Afrite *et al.*, 2013).

care needs important? Has the development of these healthcare structures had an impact on GP density? The first phase of the analysis involved constructing two typologies of social, health and economic situations characterising on the one hand predominantly rural areas of France and on the other, predominantly urban areas, and studying the distribution of MS within these areas. In the second phase, with the categories thus defined, we compared the evolution of GP population density over two consecutive periods (2004-2008, 2008-2011) in comparable spaces and according to whether they contained at least one MS or PS or not.

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**Three quarters of MS are situated in predominantly rural living areas representing a third of the French metropolitan population**

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The locational analysis of MS and PS is based on data supplied by the General Directorate of Health care Supply (*Direction générale de l'offre de soins, DGOS*) and the Observatory of Health Service Supply Re-structuring<sup>1</sup> so as to provide a sufficiently large sample. The Observatory indiscriminately identifies "maisons de santé" and "pôles de santé" under the single denomination "maisons de

<sup>1</sup> Instruction DGOS/PF3 n° 2013-213 of May 28th 2013.

santé". In January 2013, France counted 291 MS: 207 in predominantly rural areas, 80 in predominantly urban areas, and 4 in the overseas departments (DOM) [map 1].

The locational analysis of MS and PS is based on spatial typologies of the French national territory constructed using the bottom-up method of hierarchical classification (Methods insert). Several dimensions are taken into account so as to reveal relationships between populations' socio-economic characteristics, primary care supply and the spatial structure of locations according to their rural, urban or semi-urban predominance and healthcare service accessibility in terms of distance. The DOM were not included in the typology because certain indicators were unavailable.

The defined typologies allowed us to determine six types of predominantly rural "living areas" and seven classes of "pseudo canton" (aggregated municipalities) for the predominantly urban areas

(insert 1). The typology of rural living areas is characterised by the distinction made between socio-economically advantaged living spaces and those where health status is more deteriorated, zones well-served in primary healthcare supply and industrial zones and finally agricultural zones and disadvantaged zones. The "pseudo-canton" typology opposes advantaged and disadvantaged zones in socio-economic terms, peripheral zones against central zones and finally zones well-endowed with primary healthcare services against industrial zones.

These social-health typologies in predominantly rural and urban zones reveal spatial structures partially superimposed on older, historical structures (maps 2 and 3): among them, the "empty diagonal", industrial France, rural France, attractive coastal regions, or even the North/South divide. The sparsely populated "empty diagonal" extending from the Pyrenees to the Ardennes is partially superimposed on class 3 living areas, notably characterised by its

relative isolation, an ageing population and its lesser attractiveness. The spatial structure of the industrial and agricultural rural areas of northern France are also apparent in class 1 and 2 living areas or class 6 "pseudo cantons". The traditionally industrial north-east of France is apparent through the more deteriorated health status of populations living in class 2 living areas and class 6 "pseudo-cantons". French migration dynamics over the last few years, reflecting regional attractiveness, is also distinguished. Thus, the Mediterranean and Atlantic coasts, rural zones in the South of France, and rural coastal zones distinguish themselves by their residential and tourist attractiveness and are clearly identifiable in class 4 living areas and class 3 "pseudo-cantons". Furthermore, the semi-urban zones, principal receptors of demographic growth over the last decades, appear in class 5 and 6 living areas and class 1 and 4 "pseudo-cantons". In addition, by more specifically studying the known spatial structures of medical demographics, we find the same opposition between the northern

## E1

### The six classes of living area in predominantly rural zones

**Class 1.** Living areas dominated by industry and agriculture essentially situated in the north-western quarter of France, relatively under-served compared with the average in terms of primary healthcare supply and with a declining density of general practitioners. This class counts 333 living areas representing 24% of French metropolitan living areas and 22% of the population.

**Class 2.** Living areas for the majority situated in the north-eastern quarter of France, disadvantaged in socio-economic and health terms and where the supply of private general practitioners is lower, ageing and declining. This class counts 264 living areas, representing 19% of French metropolitan living areas and 23% of the population.

**Class 3.** Living areas in sparsely populated rural areas, suffering from migration loss, remote from services and counting an ageing population in poorer health. These areas have a satisfactory supply of primary healthcare services but the supply of private general practitioners is ageing and declining. This class counts 206 living areas representing 14% of French metropolitan living areas and 10% of the population.

**Class 4.** Living areas in the majority situated in the South of France or coastal regions attractive to the population. Home to more fragile populations (unemployed, elderly) they are well served in primary healthcare supply but more remote from the services. This class counts 207 living areas representing 14% of French metropolitan living areas and 14% of the population.

### Two typologies: living areas and pseudo cantons

**Class 5.** Suburban living areas around major urban centres, relatively wealthy, housing a younger population, attractive to the population and general practitioners but relatively under-served in terms of primary healthcare supply. This class counts 297 living areas representing 21% of French metropolitan living areas and 23% of the population.

**Class 6.** Suburban living areas around the major French cities, highly privileged in socio-economic and health terms but slightly less well-served in terms of primary healthcare supply. This class counts 109 living areas representing 8% of French metropolitan living areas and 8% of the population.

### The seven classes of "pseudo-canton" in predominantly urban areas

**Class 1.** "Pseudo-cantons" made up of near suburbs around small provincial towns or outer-ring suburbs around larger towns. Attractive to the population and general practitioners, they are nevertheless under-served in terms of primary care professionals. This class counts 538 "pseudo-cantons" representing 25% of French metropolitan "pseudo cantons" but only 9% of the predominantly urban population.

**Class 2.** "Pseudo-cantons" on the outskirts of predominantly urban areas, dominated by industry or agriculture. Their population is more elderly, the supply of general practitioners is ageing and on the decline and they are more remote from services. This class counts 322 "pseudo cantons" representing 15% of French metropolitan "pseudo cantons" but only 2% of the population.

**Class 3.** Urban and semi-urban "pseudo-cantons" in

the majority situated in the South of France. They are made up of socially mixed communities, well-served in primary healthcare professionals and attractive for the population and private general practitioners alike. This class counts 218 "pseudo cantons" representing 10% of French metropolitan "pseudo-cantons" but only 6% of the population.

**Class 4.** Relatively wealthy urban and semi-urban "pseudo-cantons" around major urban centres. Attractive for the population and general practitioners, they are well-served in primary healthcare professionals. This class counts 416 "pseudo-cantons" representing 19% of French metropolitan "pseudo-cantons" and 20% of the population.

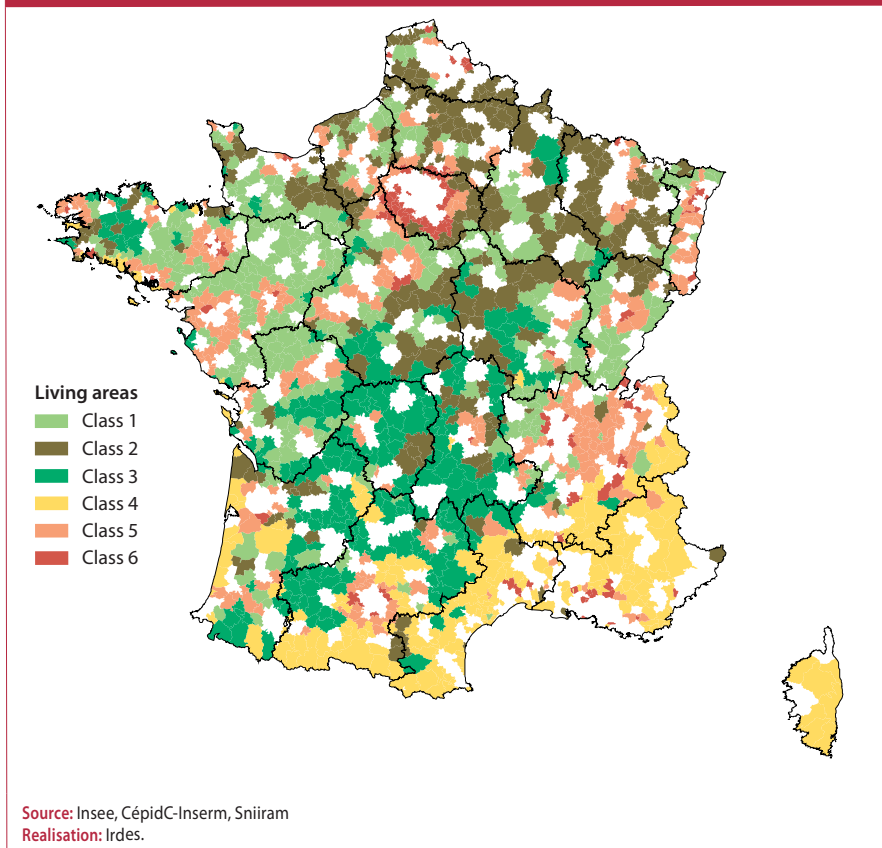
**Class 5.** Pseudo-cantons bordering major French urban centres, very advantaged in social health and economic terms and with an abundant healthcare supply. This class counts 117 "pseudo-cantons" representing 5% of French metropolitan "pseudo-cantons" but 15% of the population.

**Class 6.** Mainly industrial "pseudo-cantons" situated in the north and east of France and port cities. The population's health status is poorer and the supply of general practitioners good but declining. This class counts 273 "pseudo-cantons" representing 12% of French metropolitan "pseudo-cantons" and 9% of the population.

**Class 7.** "Pseudo-cantons" in major towns where the population's socio-economic characteristics are extremely heterogeneous but well-served in healthcare supply. This class counts 305 "pseudo-cantons" representing 14% of French metropolitan pseudo-cantons but 40% of the population.

C2

Social health characteristics of predominantly rural living areas

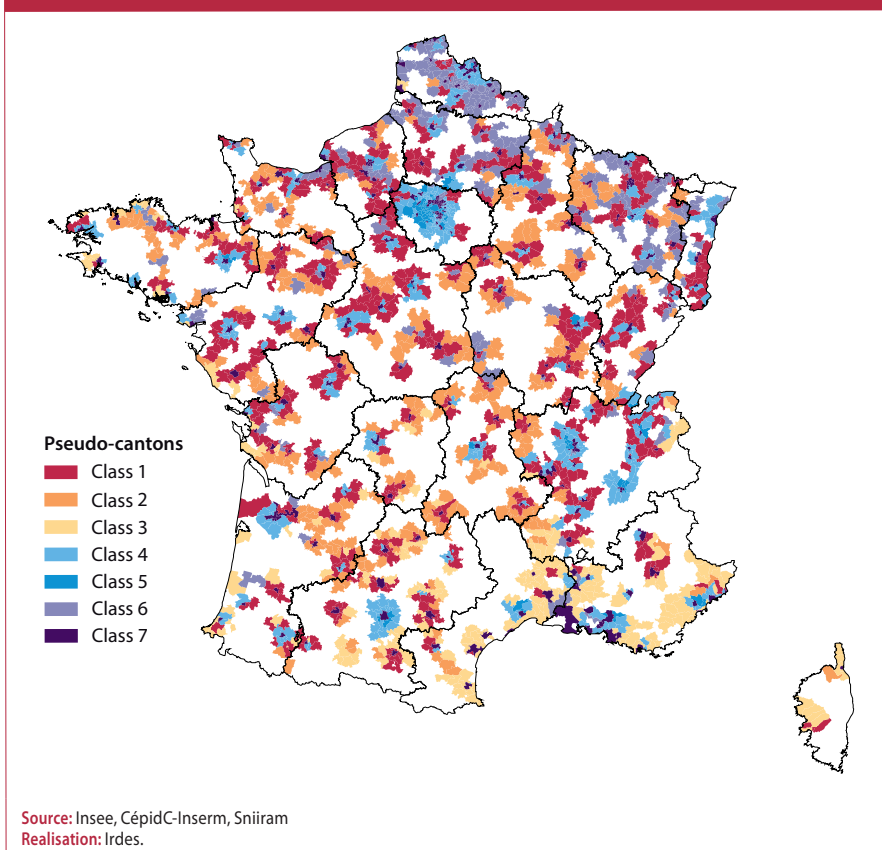


and southern regions of France in terms of GP density. For example, class 3 and 4 living areas benefit from a higher density of GPs and are more frequently located in the south of France.

These typologies thus reveal spatial structures and dynamics that are either global or specific, static or shifting, relative to demography, the economy, health status or healthcare supply. In addition, they provide a synthetic view of these territorial combinations through the different dimensions defining each topology. By comparing healthcare supply dynamics with population dynamics, we observe a more tenuous healthcare supply in certain areas: zones where the supply and distribution of general practitioners appears abundant but is in fact ageing and in decline, zones already under-serviced and also fragile, attractive semi-urban areas with fewer healthcare services but in which healthcare supply appears to follow demographic growth. These combinations also allow us to distinguish areas with a similar supply of GPs but distinct in terms of care needs. This is case for class 2 living areas, for example, where care needs are higher compared with classes 5 and 6.

C3

Social health characteristics of predominantly urban "pseudo-cantons"



These different configurations and their comparisons allow us to study the pertinence of MS and PS locations in comparison to with care needs using an innovative analytical framework, and also the spatial structure of locations by distinguishing between predominantly urban and predominantly rural areas.

**In predominantly rural areas, the majority of MS are located in under-serviced living areas in terms of healthcare supply**

Three quarters of MS are situated in predominantly rural areas. In these areas, they are located in relatively under-serviced living areas in terms of healthcare supply (classes 1 and 2), or in areas where population health is relatively poor (class 2) [map 2]. The MS located in these areas thus appear to answer the need to maintain primary healthcare supply. In effect, these MS are essentially located in disadvantaged living areas both in socio-economic and social health terms, relatively under-serviced in terms of healthcare supply with a declining GP population (26%)

[class 2] [table 1], in industrial living areas under-served in terms of healthcare supply (23%) [class 1], in predominantly rural living areas relatively distant from healthcare services with an ageing population in poorer health, a relatively good but tenuous primary healthcare supply but fewer specialists (23%) [class 3], and in semi-urban living areas slightly poorer in terms of healthcare supply but with a healthier population (20%) [class 5]. MS are rarely located in highly advantaged semi-urban areas (2%) [class 6] and attractive living areas situated in the south of France (6%) [class 4].

A comparison between the distribution of municipalities with MS and GP density, without taking the number of health professionals working in these structures into account, enriches the analysis (table 1).

First, almost three quarters of municipalities with a MS are located in predominantly rural areas (206 out of 282), but represent only a third of general practitioners. In addition, MS are comparatively more numerous than private general practitioners and are thus over-represented, in class 1, 2 and 3 living areas. Overall we find 52% of MS against 17% of general practitioners and, more specifically, 72% of MS in predominantly rural areas against 52% of general practitioners.

### The remaining 25% of MS are located in predominantly urban areas housing two thirds of the French population

The remaining 25% of MS are essentially located in urban centre "pseudo-cantons", more heterogeneous in socio-economic and social health terms but fairly

well-served in terms of healthcare supply (33%) [class 7]. 24% of MS are situated in semi-urban "pseudo-cantons" less well-served in terms of healthcare supply (class 1), 20% in urban and semi-urban "pseudo-cantons", attractive for both the population and GPs and with a good healthcare service supply (class 4), and finally 13% in peripheral, predominantly industrial "pseudo-cantons" with a population in poorer health (class 6) [table 2].

A little over a quarter of MS are located in predominantly urban areas whereas the same areas represent two thirds of general practitioners working in metropolitan France. The MS are more often located in class 1 living areas representing 24% of MS but only 4% of general practitioners. They are also numerous in class 4 and 6 living

T1

Distribution of municipalities according to whether or not they host a "maison de santé" within the living area typology classes

	Municipalities with "maisons de santé"			Private general practitioners			Population	
	Number	Share	Share of total municipalities with a maison de santé	Number	Share	Share of total general practitioners	Share	Share of total metropolitan population
Class 1	48	23%	17%	3,368	20%	6%	22%	7%
Class 2	53	26%	18%	3,650	21%	7%	23%	7%
Class 3	47	23%	17%	1,964	11%	4%	10%	3%
Class 4	13	6%	5%	3,052	18%	6%	14%	5%
Class 5	41	20%	15%	3,784	22%	7%	23%	8%
Class 6	4	2%	1%	1,350	8%	3%	8%	3%
<b>Total</b>	<b>206</b>	<b>100%</b>	<b>73%</b>	<b>17,168</b>	<b>100%</b>	<b>33%</b>	<b>100%</b>	<b>33%</b>

Source: Observatoire des recompositions (DGOS), Sniiram. Exploitation: Irdes.  Download the Excel® file on IRDES Internet site.

T2

Distribution of municipalities according to whether or not they host a "maison de santé" within "pseudo-cantons" typology classes

	Municipalities with "maisons de santé"			Private general practitioners			Population	
	Number	Share	Share of total municipalities with a maison de santé	Number	Share	Share of total general practitioners	Share	Share of total metropolitan population
Class 1	18	24%	6%	2,338	7%	4%	9%	6%
Class 2	3	4%	1%	532	1%	1%	2%	1%
Class 3	3	4%	1%	2,606	7%	5%	6%	4%
Class 4	15	20%	5%	6,921	20%	13%	20%	13%
Class 5	2	2%	1%	3,359	9%	6%	15%	10%
Class 6	10	13%	4%	2,970	8%	6%	9%	6%
Class 7	25	33%	9%	16,950	48%	32%	40%	27%
<b>Total</b>	<b>76</b>	<b>100%</b>	<b>27%</b>	<b>35,676</b>	<b>100%</b>	<b>67%</b>	<b>100%</b>	<b>67%</b>

Source: Observatoire des recompositions (DGOS), Sniiram. Exploitation: Irdes.  Download the Excel® file on IRDES Internet site.

E2

### The analysis of medical demographic trends in zones with and without "maisons de santé"

By comparing trends over two consecutive periods (2004-2008, 2008-2011) in both case and control sites, the "difference in differences" method allows us to eliminate two biases (Imbens and Wooldridge, 2009): permanent bias from the initial differences (selection) and common bias from the general trends within the system (temporal). This approach can be formalised as follows using linear regression:

$$Y_i = \beta_0 + \beta_1 \cdot \text{AFTER} + \beta_2 \cdot \text{CASE} + \beta_3 \cdot \text{AFTER} \cdot \text{CASE} + \varepsilon_i$$

With  $Y_i$ , density or its evolution AFTER a variable with the value 0 for before and 1 after, and CASE a variable with the value 0 for control sites and 1 for case sites.

The estimated parameters are presented as follows in the following tables of results:

Sphere	Density of general practitioners-average	2004-2008			2008-2011			Difference in differences
		Control	Case	Difference before	Control	Case	Difference after	
		$\beta_0$	$\beta_0 + \beta_2$	$\beta_2$	$\beta_0 + \beta_1$	$\beta_0 + \beta_1 + \beta_2 + \beta_3$	$\beta_2 + \beta_3$	$\beta_3$

areas, representing respectively 20% and 13% of MS but 13% and 6% of GPs.

### A tendency toward maintaining medical density in zones where MS are located

Under new groupings, the previously defined classes enable the analysis of GP density in comparable zones over two consecutive periods (2004-2008, 2008-2011). Zones with MS (case) and those without (control) are distinguished using the differences in differences method (insert 2). 2008 was chosen as the key date in that it marks the acceleration of support policies aimed at MS (Afrite *et al.*, 2013).

The analysis sample is made up of 1,228 control living areas and 183 cases in rural areas, and 1,752 control "pseudo cantons" and 74 cases in urban areas.

### A slighter decrease in general practitioner density in predominantly rural areas

So as to constitute sufficiently large samples for this analysis, class 1 and 2 living areas were grouped together, as were class 3 with class 4, and class 5 with class 6.

We thus grouped together living areas by class according to the following criteria: under-serviced living area in terms of healthcare supply (classes 1 and 2), under-serviced in terms of care needs but with a satisfactory healthcare supply (classes 3 and 4), well-serviced in terms of care needs but a poorer healthcare supply (classes 5 and 6).

Over the entire period from 2004-2011, changes in GP density are not significantly different in areas with or without a MS (table 3). However, we observe a higher density of GPs in class 1 and 2 living areas with a MS in 2011 compared with 2004. The density gap also narrows slightly in class 3 and 4 living areas in favour of zones with a MS, but they nevertheless remain under-serviced. Finally, in the class 5 and 6 living areas, the density gap increases in favour of zones with a MS.

On the other hand, when we compare developments in GP density over two

T3

### General practitioner population density 2004 versus 2011 in living areas

	2004-2008			2008-2011			Difference in differences
	Control	Case	Difference before	Control	Case	Difference after	
<b>Classes of living areas 1 and 2</b>							
Density <sup>1</sup> of general practitioners, average	80.2	78.5	-1.7	73.9	74.4	0.5	2.2
Numbers	509	88	-	509	88	-	-
<b>Classes of living areas 3 and 4</b>							
Density <sup>1</sup> of general practitioners, average	109.5	98.5	-10.9***	100.2	90.9	-9.2**	1.7
Numbers	356	54	-	356	53	-	-
<b>Classes of living areas 5 and 6</b>							
Density <sup>1</sup> of general practitioners, average	81.3	81.9	0.6	81.5	87.1	5.6	5.0
Numbers	363	42	-	363	42	-	-

<sup>1</sup> Density per 100,000 inhabitants.

Averages and standard deviations estimated by linear regression without co-variables. \*\*\* p<0.01; \*\* p<0.05; \* p<0.1

Sources: Observatoire des recompositions (DGOS), Sniiram. Exploitation: Irdes.

[Download the Excel® file on IRDES Internet site.](#)

T4

### General practitioner population density trends 2004-2008 versus 2008-2011 in living areas

	2004-2008			2008-2011			Difference in differences
	Control	Case	Difference before	Control	Case	Difference after	
<b>Classes of living areas 1 and 2</b>							
Difference of density <sup>1</sup> of general practitioners, average	-3.7	-3.8	-0.2	-2.6	-0.3	2.3**	2.5
Numbers	509	88	-	509	88	-	-
<b>Classes of living areas 3 and 4</b>							
Difference of density <sup>1</sup> of general practitioners, average	-5.6	-4.7	1.1	-3.7	-1.9	1.7	0.6
Numbers	356	54	-	356	54	-	-
<b>Classes of living areas 5 and 6</b>							
Difference of density <sup>1</sup> of general practitioners, average	-0.4	1.5	1.9	0.5	3.7	3.1*	1.2
Numbers	363	42	-	363	42	-	-

<sup>1</sup> Density per 100,000 inhabitants.

Averages and standard deviations estimated by linear regression without co-variables. \*\*\* p<0.01; \*\* p<0.05; \* p<0.1

Sources: Observatoire des recompositions (DGOS), Sniiram. Exploitation: Irdes.

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consecutive periods 2004-2008 and 2008-2011, differences emerge between zones with (case) and without (control) MS [table 4]. In disadvantaged living areas (classes 1 and 2), if there was a negative and comparable development between cases and controls, over the period 2008-2011, they remain negative but significantly less so in case sites compared with control sites. Overall, disadvantaged living areas with MS gained on average 2.5 GPs per 100,000 inhabitants between the two periods compared with areas without MS, even if the results are non-significant due to probably sample size (table 3).

In disadvantaged living areas in terms of care needs but with a satisfactory healthcare supply (classes 3 and 4), developments are comparable between case and control locations and negative, although less, so over the period 2008-2011 compared with 2004-2008.

For well-served living areas in terms of care needs but a lesser healthcare supply (classes 5 to 6), developments are positive for case locations over the period 2004-2008 and negative for controls. During the following period, 2008-2011, they are positive and significantly greater for cases in comparison

with controls. Overall, living areas with MS gained on average 1.2 general practitioners between the two periods compared with areas without, the results being nevertheless non-significant (table 4).

### An improvement in the density of general practitioners in under-served semi-urban areas in terms of healthcare supply

At "pseudo-canton" level, similar analyses were carried out grouping together classes according to healthcare supply: disadvantaged (classes 1 and 2), median (classes 4, 5 and 6) or advantaged (classes 3 and 7). Results should be considered with caution given the small sample size.

Once again, over the whole period 2004-2011, changes in the density of general practitioners differ but are non-significant between "pseudo-cantons" with and without MS. Between urban areas with or without MS, the density gap is inverted in class 1 and 2 "pseudo-cantons" in favour of areas with MS, is inverted in classes 3 and 7 in disfavour of areas with MS and finally, increases in class 4, 5 and 6 "pseudo-cantons" (table 5).

On the other hand, over the two consecutive periods 2004-2008 and 2008-2011, the dynamics of evolution of general practitioner density reveal significant differences between areas with and without MS (table 6).

For the disadvantaged "pseudo-cantons" (classes 1 and 2), if during the period 2004-2008, developments are negative and comparable between areas with and without MS, developments in the following period from 2008-2011 remain negative for the first but are inverted for the second to become positive. "Pseudo-cantons" gained on average 14 general practitioners per 100,000 inhabitants between the two periods and between disadvantaged "pseudo-cantons" with MS compared to those without in terms of healthcare supply.

For "pseudo-cantons" with a median healthcare supply (classes 4, 5 and 6), developments between 2004 and 2008 are different, negative for the controls, and positive for cases although non-significant. Between 2008 and 2011, development is positive for cases and controls and

T5

#### General practitioner population density 2004 versus 2011 in pseudo cantons

	2004			2011			Difference in differences
	Control	Case	Difference before	Control	Case	Difference after	
<b>Classes of pseudo-cantons 1 and 2</b>							
Density <sup>1</sup> of general practitioners, average	71.5	68.3	-3.2	68.2	70.2	2.0	5.2
Numbers	579	20	-	572	20	-	-
<b>Classes of pseudo-cantons 4, 5 and 6</b>							
Density <sup>1</sup> of general practitioners, average	85.1	87.4	2.3	84.9	90.8	5.9	3.6
Numbers	720	26	-	721	27	-	-
<b>Classes of pseudo-cantons 3 and 7</b>							
Density <sup>1</sup> of general practitioners, average	104.8	106.6	1.8	100.7	95.9	-4.8	-6.6
Numbers	459	28	-	459	28	-	-

<sup>1</sup> Density per 100,000 inhabitants.

Averages and standard deviations estimated by linear regression without co-variables. \*\*\* p<0.01; \*\* p<0.05; \* p<0.1

Sources : Observatoire des recompositions (DGOS), Sniiram. Exploitation : Irdes.

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T6

#### General practitioner population density trends 2004-2008 versus 2008-2011 in pseudo cantons

	2004-2008			2008-2011			Difference in differences
	Control	Case	Difference before	Control	Case	Difference after	
<b>Classes of pseudo-cantons 1 and 2</b>							
Difference of density <sup>1</sup> of general practitioners, average	-2.5	-6.9	-4.4	-0.9	8.7	9.6***	14***
Numbers	576	20	-	572	20	-	-
<b>Classes of pseudo-cantons 4, 5 and 6</b>							
Difference of density <sup>1</sup> of general practitioners, average	-0.2	1.9	2.1	0.1	1.7	1.6	-0.5
Numbers	720	26	-	721	27	-	-
<b>Classes of pseudo-cantons 3 and 7</b>							
Difference of density <sup>1</sup> of general practitioners, average	-1.1	-4.7	-3.6	-3.0	-6.1	-3.0	0.6
Numbers	459	28	-	459	28	-	-

<sup>1</sup> Density per 100,000 inhabitants.

Averages and standard deviations estimated by linear regression without co-variables. \*\*\* p<0.01; \*\* p<0.05; \* p<0.1

Sources : Observatoire des recompositions (DGOS), Sniiram. Exploitation : Irdes.

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the gap narrows without inasmuch being significant.

For the more advantaged "pseudo cantons" in terms of healthcare supply (classes 3 and 7), developments are negative over the two periods and not significantly different between cases and controls.

\* \* \*

These first results indicating a trend toward an evolution in GP demographics in areas both with and without a MS have partially answered the questions posed in the introduction.

MS are in the majority located in predominantly rural areas with a more tenuous healthcare supply and are proportionally more numerous in these areas than private general practitioners. This suggests that MS are essentially established in the aim

of maintaining healthcare supply in areas where needs are important. This over-representation is no doubt minimised given that the number of general practitioners working in MS are not taken into account. Furthermore, the development of these structures appears to be effective since we observe a slowdown in the decline of GP population density between 2008 and 2011 in these areas compared with similar areas without a MS.

In predominantly urban areas with fewer MS, the creation of these structures suggest an aim of rebalancing primary care supply in relatively under-served semi-urban zones. In addition, the analysis reveals an improvement in GP population density in these zones compared with those without MS.

Certain factors nevertheless indicate that these results should be taken with precau-

tion. On the one hand it is impossible to analyse changes in medical demographics class by class from the number of health professionals working in MS, and on the other, the analysis period following the development of MS (2008-2011) remains relatively short. Also, the distinction between "maisons de santé" and "pôles de santé", impossible with the available data, would permit carrying out a comparative analysis of the impact of these two distinct forms of organisation on medical demography. Finally, if for semi-urban zones, the "pseudo-canton" appears to provide a satisfactory level for analysis, it appears more limited for densely populated urban areas. In this case, an analysis at neighbourhood level would provide a finer description of the social and health contexts in which these structures are established and allow us to gain better knowledge of their impact. ♦

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