

GEOGRAPHIC VARIATIONS IN HEALTH CARE NEEDS AND ACCESS TO PRIMARY CARE: EXPERIENCE FROM THE FRENCH HEALTH EXAMINATION CENTRES (HECS).

Florence Naudin, René Guéguen

Centre Technique d'Appui et de Formation des Centres d'Examens de Santé (Cetaf),
Saint Etienne, France. Contact : florence.naudin@cetaf.cnamts.fr

Abstract

It is common belief that healthcare systems should aim at ensuring that citizens enjoy universal and equitable access to good quality health care. Several methodologies have been established to evaluate accuracy of need and supply of care. However since the main data sources are national population household surveys, estimates of need for health care are usually based on declarative outcomes of health status. Through preventive examinations performed in the Health Examination Centres (HECs) of the French General Health Insurance, epidemiologic data are routinely collected and can provide normative assessments of health care needs in the general population. Three indicators have been selected to illustrate this advisability: untreated high blood pressure, non-treated dental caries and insufficient vaccine coverage. The purpose of our study was to compare the prevalence of these observed needs before and after adjustment on several determinants measured at the individual level.

Methods: The study population included 742 003 people, aged 25 years and older, attending one of the 90 French HECs in 2002 or 2003. HECs are supported by the French General Health Insurance scheme and are distributed over the 23 French regions to provide preventive health examinations, targeting especially disadvantaged people. Three indicators of medical needs were selected: untreated high blood pressure, presence of non-treated dental caries and insufficient vaccine coverage.

Results: 6,3% of subjects aged 60 years or more who came to an HCE revealed to have untreated high blood pressure; 37% of subjects aged 25-44 and 29,6% of subjects aged 45-59 revealed to have non-treated dental caries; 34,5% of subjects aged 25-59 and 37,5% of subjects aged 60 years revealed to have insufficient vaccine coverage. Need indicators appeared to be more frequent for subjects who had no complementary health insurance, who had a low education level or manual occupational class. Having non-treated dental caries and insufficient vaccine coverage also appeared to be more frequent for deprived subjects and people who did not live as a couple. Increasing frequency of visits to a physician or a dentist resulted in decreasing risks of having insufficient vaccine coverage or non-treated dental caries. Regions of southern France having high physician density showed lower prevalences of untreated high blood pressure. Dentists' density appeared to be negatively correlated with non-treated dental caries and decreasing medical density resulted in increasing risks of having insufficient vaccine coverage. However when comparing adjusted odds ratios of having unmet needs at regional level, including medical density or dentist's density did not induce significant change.

Discussion: This study provided an original overview of the prevalences of some unmet needs and their geographic variations in French general population. The results confirmed that needs for medical care can either be unknown or not expressed, partly because of ignorance on treatments and services or because of an aversion or difficulties to access health-care services. The main limitation of our results is the possible selection bias of the study population which may hamper the generalization to the French population. Another limitation was that relations between the different need indicators, especially between indicators of need for curative care and indicator of need for preventive care were not explored.

Keywords : access to care ; equity ; regional disparities; need of healthcare; France

Introduction

It is common belief that healthcare systems should aim at ensuring that citizens enjoy universal and equitable access to good quality health care. There is profuse literature on equity in health and health care access. Three main approaches can be mentioned.

A first approach focuses on resource allocation and on the procedures that may be deployed to meet the need. Donabedian [1] developed a model which expresses needs and resources in equivalent units in order to estimate the ratio of resources to need. The optimum resource/need ratio is regarded as that pertaining to a reference population; and deviation from this optimum ratio in the subunits of the reference population is interpreted as a manifestation of inequitable resource distribution.

A second approach is based on the concept of horizontal equity, i.e those with equal needs should have equal opportunities to access and to use health care. The OECD Study on Measuring Equity of Access to Health Care [2] followed generally the method that Van Doorslaer developed under the ECuity II project funded by the European Community [3] with the view to measure access to selected health care services and focus on variations in utilisation across income groups. The study provided up-to-date comparative information on income-related equity of access to health care among OECD countries and aimed at examining causes of variations by looking at selected health system characteristics (eg., insurance coverage and geographic variations in the availability/use of resources) and other socio-economic factors (eg., education).

A third approach deals with geographic variations of supply of care and place effects on health. Numerous studies began to develop the multilevel analytical approach. Since some differential patterns of need remain, even in regions which have comprehensive supply of care contextual studies emerged more recently, viewing space as a continuum to yield more relevant information on the spatial distribution of outcomes [4]. Healthcare utilisation in France was taken as an illustrative example by Chaix [5] in comparing the spatial approach with the multilevel approach.

In these various approaches the main data sources are national population household surveys and estimates of need for health care are usually based on declarative outcomes of health status or specific measures of morbidity. Examples of generic measures would include measures of perceived health status, measures of disability or measures of health status obtained from instruments such as the SF-36.

Self-assessment of health does not seem relevant to assess individual needs and to study their adequacy with availability of care in a given area. On the one hand, there are needs for medical care which cannot be self-diagnosed. On the other hand, some needs are felt but not expressed, because of ignorance that treatments and services exist to mitigate or remove the need. Since they are not, they must be expressed by others and declarative health status as a proxy for need measurement encounters its limits.

Different studies tried to investigate the practical values of using questionnaires (self-perceived assessment) as compared to clinical examinations (normative assessment) and to evaluate the implications of the results in understanding the public's perception of health. For example, in the field of dental health clinical, subjective evaluation of caries have been reported to demonstrate a significant disparity [6-8].

However such clinical data are costly to collect especially when associated with national population household surveys. Another way to assess needs based on clinical examinations in France could be found in existing databases such as the French hospital database named 'Programme de medicalisation des systemes d'information (PMSI)', or in individual medical records held by sample of general practitioners. The problem when using these databases is that contacts with health services are motivated by symptoms or disease and estimations of needs tend to be biased.

The large data base of the Health Examination Centres (HECs) of the French General Health Insurance can provide normative assessments of health care needs in the general population. There are currently 90 HECs, distributed over the 23 French regions. Since they perform preventive health examinations (about 600 000 people each year), it is a chance to collect epidemiologic data in the general population.

In an attempt to further investigate the relationship between the needs of care and use as well as availability of health care services, we performed an analysis using the data base of the HECs. Three indicators of medical needs were selected: untreated high blood pressure, presence of non-treated dental caries and insufficient vaccine coverage. They have been chosen since they have concern with different fields of health promotion : general health, oral health and prevention. The diagnosis of high blood pressure in an individual is important so that efforts can be made to normalize the blood pressure and, thereby, to prevent the complications. Accordingly, increased public awareness and screening programs to detect early, uncomplicated hypertension are the keys to successful treatment. Concerning oral health, caries are one of the foremost oral pathologies and people tend to underestimate their dental treatment needs since oral carious lesions can not be self-assessed before they cause pain. As far as the study of vaccine coverage is concerned, disparities in vaccination rates are critical for improving the process of providing preventive care as well as for improving broader public health initiatives.

The present analysis was aimed at analysing the determinants of the three healthcare needs measured at the individual level and comparing map-based descriptions of the odds-ratios for having unmet needs among French regions, before and after adjustment on medical density and other cofactors.

Subjects and methods

Health Examination Centres

The 90 Health Examination Centres (HECs) supported by the French General Health Insurance scheme are distributed over the 23 French regions. They provide preventive health examinations, targeting especially disadvantaged people. About 600 000 examinations were yearly performed.

The eligible population for Health Examination Centres was all salaried people and beneficiaries, active or retired, from the French General Health Insurance (which covers approximately 85% of the French population). Subjects were either randomly invited from Social Security register files, came spontaneously, or were invited through various organizations in charge of people with socioeconomic problems.

All health indicators and measurement procedures included in the health examination performed by the HECs have been defined and selected by panels of French scientific and medical experts.

Study population

Epidemiologic data are routinely collected from each preventive health examination performed. The study population was composed from almost all patients who attended one of the 90 French HECs in 2002 or in 2003, there were 742 003 people, aged 25 years and older (table 1).

Table 1 Gender, age and deprivation status of the study population

	Males		Females		Total
	Non-deprived	Deprived	Non-deprived	Deprived	
25-44 years	101 257	48 820	92 388	56 394	298 859
45-59 years	109 574	38 195	96 318	36 625	280 712
60 years and older	79 615	57 10	72 530	4 577	162 432
Total	290 446	92 725	261 236	97 596	742 003

Need indicators

Untreated high blood pressure

The prevalence of untreated high-blood-pressure was estimated among 162 432 subjects aged 60 years and older.

Resting blood pressure was determined under standardized conditions in supine position on the left arm after 5 min of rest. High blood pressure was defined as systolic blood pressure ≥ 160 mm Hg and/or diastolic blood pressure ≥ 95 mm Hg. Both measures of systolic and diastolic blood pressure were combined with declarative use of anti-hypertensive medication to determine whether high blood pressure was untreated.

Non-treated dental caries

The prevalence of non-treated dental caries was estimated among 454 868 subjects aged 25-59 years who had a dental examination, i.e. 78,5% of the subjects of this age attending one of the 90 French HECs in 2002 or 2003. It happened that the examination could not be performed because there was no dentist in the HCE.

Dental examinations were performed only if the subject did not have a recent dentist's consultation (less than 3 months), with the view to determine oral health status and normative treatment needs. They consisted in following clinical findings: existing fillings, existing prosthetic replacements, decay (caries) index, periodontium, soft tissue pockets, mobility of the teeth, missing teeth, etc. The need of dental care was established if at least one carious lesion was detected.

Insufficient vaccine coverage

The prevalence of insufficient vaccine coverage was estimated separately among 579 571 subjects aged 25-59 and 162 432 subjects aged 60 years and older. Indeed, immunization recommendations may differ according to age (see table 2).

Table 2 Immunizations recommendations according to age

Age	Immunizations recommendations
25-59 years	Polio - Tetanus – Hepatitis B
60 years and older	Influenza - Tetanus - Hepatitis B

The **polio vaccine aims** at avoiding poliomyelitis virus which can be spread by drinking water with the polio virus in it. It can also be passed by close contact, such as kissing an infected person. Polio is a serious illness which can cause paralysis.

Tetanus vaccine aims at protecting against tetanus (lockjaw), a disease caused by bacteria found in soil. Tetanus is characterized by muscle stiffness and spasm or "locking" of muscles of the jaw, neck, and limbs. It is a potentially fatal disease.

Hepatitis B virus can cause lifelong infection, cirrhosis (scarring) of the liver, liver cancer, liver failure, and death. People who are at risk include people who have more than one sex partner in 6 months, men who have sex with other men, sex contacts of infected people, people who inject illegal drugs, healthcare and public safety workers who could come in contact with blood or other body fluids, household members of people with chronic hepatitis B infection and people on hemodialysis.

Influenza may cause fever, cough, sore throat, a runny or stuffy nose, headache, muscle aches and tiredness. For some people, it can lead to serious, even life-threatening, diseases, such as

pneumonia. **Influenza vaccine** is recommended for people who are more likely to get really sick and for elderly people who have a higher risk of flu complications, like pneumonia.

Since most patients presented their personnel vaccine book during clinical examination, HECs doctors were able to assess whether vaccine coverage was sufficient, according to French immunizations recommendations. The need of vaccine was defined if at least one of the recommended vaccines was not obtained.

Socioeconomic status

The standard examination procedure used in each centre included a questionnaire on social habits and health-related behaviours.

Education level (highest educational level achieved in five categories), occupational social class (in six classes), the fact to live as a couple and deprivation status were used as indicators of the socioeconomic status. We considered current social class for those working at the time of the study and last occupational social class for unemployed or retired subjects.

Deprivation status was defined according to the French General Health Insurance administrative definition (Ministère des Affaires Sociales et de l'Intégration. Arrêté du 20 Juillet 1992 relatif aux examens périodiques de santé. Journal Officiel n°218 du 19 septembre 1992) of deprivation which considers five categories of deprived people:

- people receiving unemployment benefit,
- subjects under minimum income protection (RMI: Revenu Minimum d'Insertion)
- people having government-sponsored job contract (CES: Contrats Emplois Solidarité),
- young aged 16 - 25 out of school system and involved in short training programs,
- homeless subjects.

Health-related behaviours

In the questionnaire, there were two questions about health care utilisation:

1. "During the past 2 years, how many times did you consult a physician (without distinction between general practitioner and medical specialist)?"
2. "During the past 2 years, how many times did you consult a dentist?"

For both questions, suggested answers were:

- none
- once a year
- twice a year
- more often.

Medication use was also recorded in the questionnaire and during the clinical examination.

Supply of physicians

The location of the Caisse Primaire d'Assurance Maladie (CPAM), primary health insurance organization, which depends on the place of residence, was known for every patient. Since there are 128 CPAM locations it gives a narrower geographic level than French departments.

For each patient, both physicians and dentist's densities in the area of the CPAM have been attributed at individual level and have been then categorized into quartiles.

Densities estimated in 2002 were taken from the SNIR database of the French General Health Insurance [9].

Statistical analysis

For each need indicator, analysis consisted in :

- (i) comparing prevalences among socio-economic characteristics, health-related behaviours and quartiles of medical or dentists' density, using chi-square tests;

- (ii) conducting multivariate analysis i.e. logistic regressions to assess relationships between unmet needs and socio-economic status, region of residence, frequency of doctor consultations, and medical density. Odds ratios (ORs) and 95% confidence intervals were calculated;
- (iii) map-based comparisons between odds ratios, before and after adjustment on cofactors, at regional level.

As far as map-based descriptions are concerned, since the samples were not large enough in certain administrative regions, we aggregated:

- Basse Normandie and Haute Normandie together
- Auvergne and Limousin together
- Provence-Alpes-Côte-d’Azur and Corse together.

Analysis was performed using SPSS 12.

Results

Untreated high blood pressure

In 2002-2003, 6,3% of subjects aged 60 years or more who came to an HCE revealed to have untreated high blood pressure (UHBP). The prevalence was 6,5% among men and 6,1% among women. When comparing prevalences among socio-economic characteristics, health-related behaviours and quartiles of medical or dentists’ density, all differences were significant, except for the item “to live a couple” in the population of men (table 3).

Table 3 Prevalence of people aged 60 years or more having untreated high pressure blood (UHBP) (%)

Characteristics		Male N=85 325	Female N=77 107
Deprivation status	Non-deprived	6,5 ^{NS}	6,0
	Deprived	6,6 ^{NS}	8,4
Complementary coverage	Yes	6,4	5,6
	No	7,4	10,0
To live as a couple	Yes	6,6 ^{NS}	5,9
	No	7,1 ^{NS}	6,9
Education level	Illiterate	8,1	14,3
	No qualification	8,5	8,0
	Secondary education	6,6	5,0
	Baccalaureate	5,6	4,1
	Higher education	5,2	3,1
Occupational class	Tradesmen	6,8	6,1
	Executives, higher-grade	5,3	3,6
	Intermediate level	5,8	4,2
	Employees	7,0	6,2
	Manuel workers	7,5	7,6
	Other	6,4	7,3
Physicians consultations	None	1,8	3,4
	Once/year	2,2	2,5
	Twice/year	4,1	3,1
	More often	9,6	8,1
Medical density in the CPAM area	1st quartile [36,5-90,9[	7,9	8,6
	2nd quartile [90,9-101,1[	7,0	6,0
	3rd quartile [101,1-118,2[	6,8	5,8
	4 th quartile [118,2-140,5]	4,7	4,5

^{NS} : The proportions of men having UHBP were not significantly different for non-deprived men compared to deprived men, nor for men living as a couple, compared to men living alone.

Having UHBP appeared to be more frequent for subjects who had no complementary health insurance, especially among women : 10% of women aged 60 years or more who did not have a complementary health insurance revealed to have UHBP compared to 5,6% among those having a complementary health insurance.

In terms of socio-economic characteristics, patients having a low education level, tradesmen, manual workers and employees were more frequently diagnosed UHBP.

As far as health services utilisation was concerned, prevalences of UHBP increased with the frequency of doctors' consultation. On the other hand the rate of UHBP tended to be as lower as medical density in the area of the CPAM was higher.

Multivariate analyse was conducted to determine the influence of each cofactor : logistic regression (table 4) showed the same significant associations than univariate analysis, apart from occupational class which was no longer related to UHBP.

The risk of having UHBP revealed to be significantly lower for women than for men (OR=0,77). The absence of complementary health insurance coverage was associated with higher risk (OR=1,22). Increasing education levels resulted in decreasing risks.

The risk of having UHBP confirmed to be more frequent when subjects had more than two contacts a year with a physician.

Medical density confirmed to be negatively correlated with UHBP prevalence: higher ORs for the first and second quartiles compared to the fourth quartile as reference, even after taking doctor consultations into consideration.

Table 4 Determinants of having untreated high pressure blood (UHBP) among people aged 60 years or more

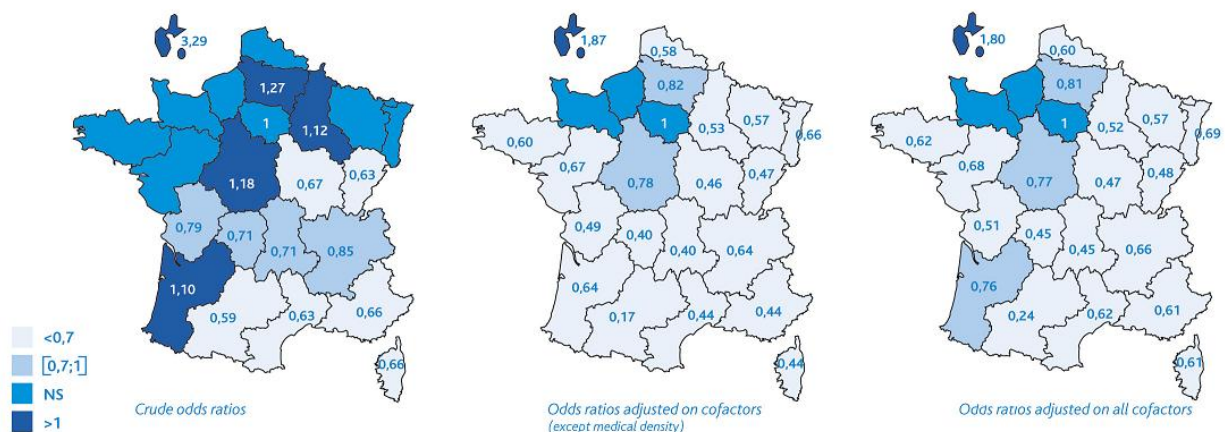
	N	Adjusted OR	95% IC	
Gender : Male	55873	1		
Female	49324	0,77	0,73	0,81
Education level				
Higher education	13278	1		
Illiterate	4462	1,75	1,53	2,00
No qualification	30329	1,58	1,44	1,74
Secondary education	44164	1,22	1,11	1,34
Baccalaureate	12964	1,05	0,93	1,18
Complementary coverage : Yes	93478	1		
No	11719	1,22	1,13	1,32
Ile-de-France	12292	1		
Alsace	5532	0,69	0,60	0,78
Aquitaine	9229	0,76	0,66	0,88
Auvergne-Limousin	1449	0,45	0,34	0,59
Bourgogne	5931	0,47	0,40	0,56
Bretagne	7688	0,62	0,53	0,72
Centre	5782	0,77	0,68	0,87
Champagne-Ardenne	1782	0,52	0,42	0,65
Franche-Comté	1671	0,48	0,38	0,62
Guadeloupe	1518	1,80	1,55	2,10
Haute et Basse Normandie	130	1,13	0,63	2,03
Languedoc-Roussillon	972	0,62	0,44	0,88
Lorraine	6466	0,57	0,50	0,66
Midi-Pyrénées	1883	0,24	0,16	0,34
Nord-Pas-de-Calais	4205	0,60	0,51	0,71
PACA-Corse	14505	0,61	0,52	0,70

Pays de la Loire	5447	0,68	0,58	0,79
Picardie	4838	0,81	0,71	0,91
Poitou-Charentes	6799	0,51	0,43	0,59
Rhône-Alpes	7078	0,66	0,57	0,76
Medical density in the CPAM area				
4th quartile [118,2-140,5]	63920	1		
1st quartile [36,5-90,9[	4346	1,47	1,30	1,68
2nd quartile [90,9-101,1[	15892	1,40	1,23	1,60
3rd quartile [101,1-118,2[	21039	1,35	1,20	1,51
Physicians consultations				
More often	26899	1		
None	23672	0,19	0,16	0,24
Once/year	24883	0,24	0,22	0,27
Twice/year	29743	0,40	0,37	0,43

Geographic variations appeared to be significant even after taking medical density into consideration. No one region exhibited a significantly higher OR than the Ile-de-France one, except for Guadeloupe (OR=1,80), a non-metropolitan region. The lowest OR was observed in Midi-Pyrenees (OR=0,24).

Three cartographic representations (figure 1) were used to show whether regional disparities remain after individual characteristics and supply care have been taken into account. The first map represents crude odds ratios over the 23 French regions. The second and third maps respectively represent adjusted odds ratios before and after including medical density among cofactors.

Figure 1 Crude and adjusted odds ratios for having untreated high pressure blood (subjects aged 60 years and more)



Comparison between the first and the second maps showed the effect of adjusting on cofactors : when taking into account socio-economic characteristics and healthcare utilisation, geographic disparities were reduced. Comparison between the second and third maps showed that when medical density was included among cofactors odds ratios did not change much : compared to individual characteristics, supply of care did not have a great influence on the risk of having untreated high blood pressure, except in the south of France. Indeed, from Aquitaine to PACA, odds ratios adjusted on all cofactors were higher.

Non-treated dental caries

In 2002-2003, 37% of subjects aged 25-44 and 29,6% of subjects aged 45-59 who came to an HCE revealed to have non-treated dental caries (NTDC). The prevalences were higher for men than for women, with a difference of 6 points (see table 5).

When comparing prevalences among socio-economic characteristics, health-related behaviours and quartiles of medical or dentists' density, all differences were significant (table 5).

Having NTDC appeared to be more frequent for deprived subjects, people who had no complementary health insurance, people who did not live as a couple, who had a low education level or low occupational class.

As far as dental health services utilisation was concerned, prevalences of NTDC decreased with the annual number of dentists' contacts, except for people who had more than two contacts.

On the other hand the lowest rate of NTDC was observed for subjects living in CPAM areas where dentist density was moderately low (second quartile only). It was higher for the subjects living in those CPAM areas where dentists' density was either very low (first quartile) or high (third and fourth quartiles).

Table 5 Prevalence of people aged 25-59 years or more having at least one non-treated dental carie (NTDC)

Characteristics		Male N=235 443	Female N=219 425
Age	25-44 years	40,0	34,0
	45-59 years	32,5	26,3
Deprivation status	Non-deprived	31,9	26,5
	Deprived	46,5	38,0
Complementary coverage	Yes	32,9	27,6
	No	49,0	42,2
To live as a couple	Yes	32,0	27,9
	No	44,8	34,3
Education level	Illiterate	48,1	44,8
	No qualification	47,1	38,8
	Secondary education	37,9	29,9
	Baccalaureate	31,5	25,5
	Higher education	25,2	20,8
Occupational class	Tradesmen	32,1	26,7
	Executives, higher-grade	25,2	20,9
	Intermediate level	28,1	22,0
	Employees	36,8	29,5
	Manuel workers	42,8	36,1
	Other	50,0	37,3
Dentists consultations	None	50,4	44,3
	Once/year	30,7	26,5
	Twice/year	29,7	26,0
	More often	38,1	33,6
Dentists density in the CPAM area	1st quartile [22-48,9[	38,2	32,9
	2nd quartile [48,9-59,1[	35,4	29,5
	3rd quartile [59,1-77,6[	34,8	29,0
	4th quartile [77,6-118,8]	36,8	30,1

Logistic regression (table 6) proved all variables to be significant. Supplementary to the indicators mentioned above, we introduced the frequency of physicians' contacts and the medical density. The risk of having NTDC revealed to be significantly lower for women than for men (OR=0,76) and for people aged 45-59 than for those aged 25-44 (OR=0,7).

Subjects who were in deprivation situation (OR=1,34) who had no complementary health insurance coverage (OR=1,31) or who did not live as a couple (OR=1,18) had higher risk of having NTDC.

Increasing education levels and higher occupational classes resulted in decreasing risks.

The risk of having NTDC also confirmed to be more frequent when subjects had not any contact with a dentist (OR=1,52) nor with a physician (OR=1,28) during the past two years.

Dentists' density appeared to be negatively correlated with NTDC for the first quartile compared to the fourth quartile as reference : subjects living in a CPAM where dentists' density was low confirmed to have a greater risk (OR=1,31) of having NTDC compared to subjects living in a CPAM area where dentists' density was high.

Medical density also appeared to be correlated with NTDC : the risk proved to be higher for subjects living in areas where medical density was in the second and third quartiles.

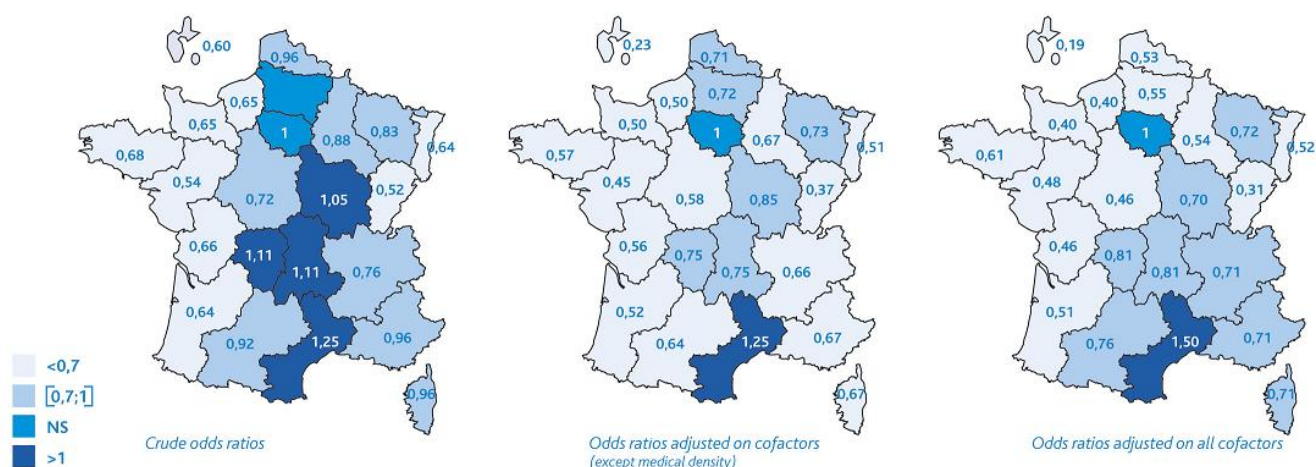
Table 6 Determinants of having at least one non-treated dental carie (NTDC) among people aged 25-59 years

	N	Adjusted OR	95% IC	
Deprivation status : No	192620	1		
Yes	91799	1,34	1,32	1,37
Gender : Male	146080	1		
Female	138339	0,76	0,75	0,78
Age : 25-44 years	145786	1		
45-59 years	138633	0,70	0,69	0,71
Live as a couple : Yes	196249	1		
No	88170	1,18	1,16	1,20
Complementary coverage : Yes	233956	1		
No	50463	1,31	1,28	1,34
Education level				
Higher education	62994	1		
Illiterate	7590	1,81	1,72	1,91
No qualification	52747	1,89	1,83	1,95
Secondary education	116124	1,58	1,54	1,62
Baccalaureate	44964	1,28	1,24	1,31
Occupational class				
Tradesmen	1321	1		
Executives, higher-grade	27310	0,92	0,81	1,04
Intermediate level	50287	1,02	0,90	1,15
Employees	89346	1,12	0,99	1,27
Manuel workers	75062	1,30	1,15	1,47
Other	41093	1,41	1,25	1,60
Region				
Ile-de-France	26906	1		
Alsace	17384	0,52	0,50	0,54
Aquitaine	30775	0,51	0,49	0,54
Auvergne-Limousin	3299	0,81	0,75	0,88
Bourgogne	12546	0,70	0,66	0,74
Bretagne	20573	0,61	0,58	0,64
Centre	18114	0,46	0,43	0,48
Champagne-Ardenne	6890	0,54	0,51	0,58
Franche-Comté	4558	0,31	0,28	0,34

Guadeloupe	6233	0,19	0,17	0,20
Haute et Basse Normandie	377	0,40	0,32	0,51
Languedoc-Roussillon	2305	1,50	1,35	1,66
Lorraine	15726	0,72	0,68	0,75
Midi-Pyrénées	4327	0,76	0,69	0,82
Nord-Pas-de-Calais	16787	0,53	0,50	0,56
PACA-Corse	34282	0,71	0,67	0,74
Pays de la Loire	13505	0,48	0,45	0,51
Picardie	16532	0,55	0,52	0,58
Poitou-Charentes	21144	0,46	0,44	0,49
Rhône-Alpes	12156	0,71	0,67	0,75
Medical density in the CPAM area				
4th quartile [118,2-140,5]	67608	1		
1st quartile [36,5-90,9[	66570	1,02	0,96	1,09
2nd quartile [90,9-101,1[	57600	1,06	1,00	1,13
3rd quartile [101,1-118,2[	92641	1,13	1,07	1,19
Physicians consultations				
More often	128032	1		
None	21737	1,28	1,24	1,32
Once/year	70239	1,07	1,04	1,09
Twice/year	64411	0,98	0,96	1,00
Dentists density in the CPAM area				
4th quartile [77,6-118,8]	64161	1		
1st quartile [22-48,9[	92087	1,31	1,22	1,40
2nd quartile [48,9-59,1[	72256	1,03	0,97	1,09
3rd quartile [59,1-77,6[	55915	0,85	0,81	0,91
Dentists consultations				
More often	36149	1		
None	58828	1,52	1,48	1,56
Once/year	149619	0,78	0,76	0,80
Twice/year	39823	0,73	0,71	0,76

At last, regional disparities appeared to be significant even after taking dentists' density and medical density into consideration. Only Languedoc-Roussillon exhibited a significantly higher OR than the Ile-de-France (OR=1,50). The lowest OR was observed in Guadeloupe (OR=0,19).

Figure 2 Crude and adjusted odds ratios for having non-treated dental carie (25-59 years old subjects)



Looking at second and third maps showed that when dentists' density was included among cofactors odds ratios did not change much : compared to individual characteristics, supply of care did not have a great influence on the risk of having non-treated dental carie, except in the south east of France. Indeed, in Rhône-Alpes, Midi-Pyrénées and PACA-Corse, odds ratios adjusted on all cofactors were higher.

Insufficient vaccine coverage

In 2002-2003, 34,5% of subjects aged 25-59 and 37,2% of subjects aged 60 years or more who came to an HCE revealed to have insufficient vaccine coverage (IVC).

The prevalences were not different for men and women. When comparing prevalences among socio-economic characteristics, health-related behaviours and quartiles of medical density, all differences were significative except for gender (table 7).

Having IVC appeared to be more frequent for deprived subjects, people who had no complementary health insurance, people who did not live as a couple, who had a low education level or manual workers.

As far as physicians' consultations were concerned, prevalences of IVC decreased with the annual number of contacts.

On the other hand the lowest rate of IVC was observed for subjects living in those CPAM areas where dentists' density was moderately high (third quartile).

Table 7 Prevalence of people aged 25-59 years or 60 years and more having insufficient vaccine coverage

		25-59 years N=579 571	60 years or more N=162 432
Gender	Male	34,2 ^{NS}	37,2 ^{NS}
	Female	34,9 ^{NS}	37,3 ^{NS}
Age	25-44 years	32,9	
	45-59 years	36,3	
Deprivation status	Non-deprived	30,5	36,1
	Deprived	43,5	53,7
Complementary coverage	Yes	31,3	35,0
	No	48,5	53,4
To live as a couple	Yes	30,7	33,3
	No	37,0	40,7
Education level	Illiterate	53,6	56,5
	No qualification	40,2	37,5
	Secondary education	31,0	32,8
	Baccalaureate	29,3	32,0
	Higher education	28,5	33,2
Occupational class	Tradesmen	41,2	33,7
	Executives, higher-grade	32,4	35,1
	Intermediate level	27,6	32,5
	Employees	34,5	37,5
	Manuel workers	34,0	38,7
	Other	46,7	43,7
Physicians consultations	None	45,5	52,4
	Once/year	35,6	42,1
	Twice/year	32,2	36,1
	More often	33,1	35,2
Medical density in the CPAM area	1st quartile [36,5-90,9[	39,6	44,2
	2nd quartile [90,9-101,1[	39,6	29,8
	3rd quartile [101,1-118,2[	29,3	32,5
	4 th quartile [118,2-140,5]	40,8	43,8

^{NS} : The proportions of subjects having IVC were not significantly different for women compared to men.

Concerning subjects aged 25-59, logistic regression (table 8) proved all variables to be significant. The risk of having IVC revealed to be significantly higher for women than for men (OR=1,04) and for people aged 45-59 than for those aged 25-44 (OR=1,29).

Subjects who were in deprivation situation (OR=1,41) who had no complementary health insurance coverage (OR=1,4) or who did not live as a couple (OR=1,07) had higher risk of having IVC. The risk of having IVC confirmed to be more frequent when subjects had a low level of education.

Increasing frequency of physicians' contacts as well as increasing medical density resulted in decreasing risks of having IVC.

At last, regional disparities appeared to be significant even after taking medical density into consideration. Three regions exhibited a significantly higher OR than the Ile-de-France : Languedoc-Roussillon (OR=1,16), Nord-pas-de-Calais (OR=1,39) and PACA-Corse (OR=1,21). The lowest OR was observed in Lorraine (OR=0,19).

Table 8 Determinants of having insufficient vaccine coverage (people aged 25-59 years)

	N	Adjusted OR	95% IC	
Gender : Male	183328	1		
Female	177095	1,03	1,02	1,05
Age : 25-44 years	185390	1		
45-59 years	175033	1,29	1,27	1,31
Deprivation status : No	245268	1		
Yes	115155	1,41	1,39	1,44
Live as a couple : Yes	248686	1		
No	111737	1,07	1,05	1,09
Complementary coverage : Yes	294707	1		
No	65716	1,40	1,37	1,43
Education level				
Higher education	80943	1		
Illiterate	9482	1,71	1,63	1,79
No qualification	67658	1,27	1,24	1,31
Secondary education	145262	1,06	1,04	1,08
Baccalaureate	57078	1,01	0,98	1,03
Occupational class				
Tradesmen	1894	1		
Executives, higher-grade	36000	0,71	0,64	0,78
Intermediate level	63818	0,63	0,57	0,69
Employees	115187	0,68	0,62	0,75
Manuel workers	92596	0,70	0,63	0,77
Other	50928	1,02	0,92	1,12
Region				
Ile-de-France	40956	1		
Alsace	19100	0,69	0,66	0,72
Aquitaine	37952	0,95	0,92	0,99
Auvergne-Limousin	5566	0,59	0,55	0,63
Bourgogne	14883	0,48	0,46	0,51
Bretagne	26685	0,67	0,65	0,70
Centre	23366	0,59	0,57	0,61
Champagne-Ardenne	7443	0,64	0,60	0,68
Franche-Comté	5390	0,66	0,62	0,71
Guadeloupe	11647	0,81	0,78	0,85
Haute et Basse Normandie	569	0,59	0,49	0,71
Languedoc-Roussillon	2438	1,16	1,06	1,27
Lorraine	22339	0,19	0,19	0,20
Midi-Pyrénées	5761	0,53	0,49	0,57
Nord-Pas-de-Calais	18927	1,39	1,33	1,45
PACA-Corse	36929	1,21	1,16	1,26
Pays de la Loire	14344	0,58	0,55	0,61
Picardie	18119	0,66	0,63	0,68
Poitou-Charentes	26247	0,39	0,37	0,41
Rhône-Alpes	21762	0,60	0,58	0,63
Medical density in the CPAM area				
4th quartile [118,2-140,5]	80218	1		
1st quartile [36,5-90,9[	92272	1,36	1,31	1,41
2nd quartile [90,9-101,1[	78319	1,08	1,04	1,12
3rd quartile [101,1-118,2[	109614	1,19	1,16	1,23
Physicians consultations				
More often	162276	1		
None	27743	1,61	1,57	1,66

Once/year	88595	1,17	1,15	1,19
Twice/year	81809	1,04	1,02	1,06

Concerning subjects aged 60 years or older, logistic regression (table 9) proved all variables to be significant, except gender.

Subjects who had no complementary health insurance coverage (OR=1,48) or who did not live as a couple (OR=1,24) had higher risk of having IVC. The risk of having IVC confirmed to be more frequent when subjects had a low level of education.

Increasing frequency of physicians' contacts as well as increasing medical density resulted in decreasing risks of having IVC.

Table 9 Determinants of having insufficient vaccine coverage (people aged 60 years or more)

	N	Adjusted OR	95% IC	
Constant		0,42		
Live as a couple : Yes	75883	1		
No	24774	1,23	1,19	1,27
Complementary coverage : Yes	89311	1		
No	11346	1,48	1,41	1,55
Education level				
Higher education	11862	1		
Illiterate	4267	1,69	1,55	1,83
No qualification	29833	1,14	1,08	1,20
Secondary education	42464	1,00	0,95	1,05
Baccalaureate	12231	0,98	0,93	1,04
Occupational class				
Tradesmen	1704	1		
Executives, higher-grade	13097	1,00	0,89	1,12
Intermediate level	14910	0,96	0,86	1,08
Employees	36471	1,09	0,98	1,21
Manuel workers	24099	1,13	1,01	1,26
Other	10376	1,28	1,14	1,43
Region				
Ile-de-France	8575	1		
Alsace	5515	0,75	0,70	0,81
Aquitaine	9166	1,07	0,98	1,16
Auvergne-Limousin	1445	0,65	0,57	0,74
Bourgogne	5923	0,45	0,41	0,49
Bretagne	7641	0,68	0,62	0,73
Centre	5755	0,54	0,51	0,59
Champagne-Ardenne	1781	0,58	0,52	0,65
Franche-Comté	1666	0,69	0,61	0,78
Guadeloupe	1504	0,98	0,87	1,10
Haute et Basse Normandie	124	0,68	0,47	0,99
Languedoc-Roussillon	970	1,34	1,15	1,56
Lorraine	6384	0,18	0,16	0,20
Midi-Pyrénées	1874	0,56	0,49	0,64
Nord-Pas-de-Calais	4197	1,71	1,56	1,87
PACA-Corse	14109	1,34	1,23	1,46
Pays de la Loire	5393	1,05	0,96	1,15
Picardie	4827	0,55	0,51	0,59
Poitou-Charentes	6768	0,38	0,35	0,42
Rhône-Alpes	7040	0,61	0,56	0,66

Medical density in the CPAM area				
4th quartile [118,2-140,5]	25353	1		
1st quartile [36,5-90,9[	20967	1,69	1,57	1,82
2nd quartile [90,9-101,1[	24766	1,17	1,09	1,25
3rd quartile [101,1-118,2[	29571	1,29	1,21	1,37
Physicians consultations				
More often	61771	1		
None	4059	1,90	1,78	2,04
Once/year	14928	1,32	1,27	1,37
Twice/year	19899	1,05	1,01	1,09

At last, regional disparities appeared to be significant even after taking medical density into consideration. The regions which exhibited a significantly higher OR than the Ile-de-France were identical to those detected in the analysis on subjects age 25-59 : Languedoc-Roussillon (OR=1,34), Nord-pas-de-Calais (OR=1,71) and PACA-Corse (OR=1,34). The lowest OR was also observed in Lorraine (OR=0,18).

Figure 3 Crude and adjusted odds ratios for having insufficient vaccine coverage (25-59 years old subjects)

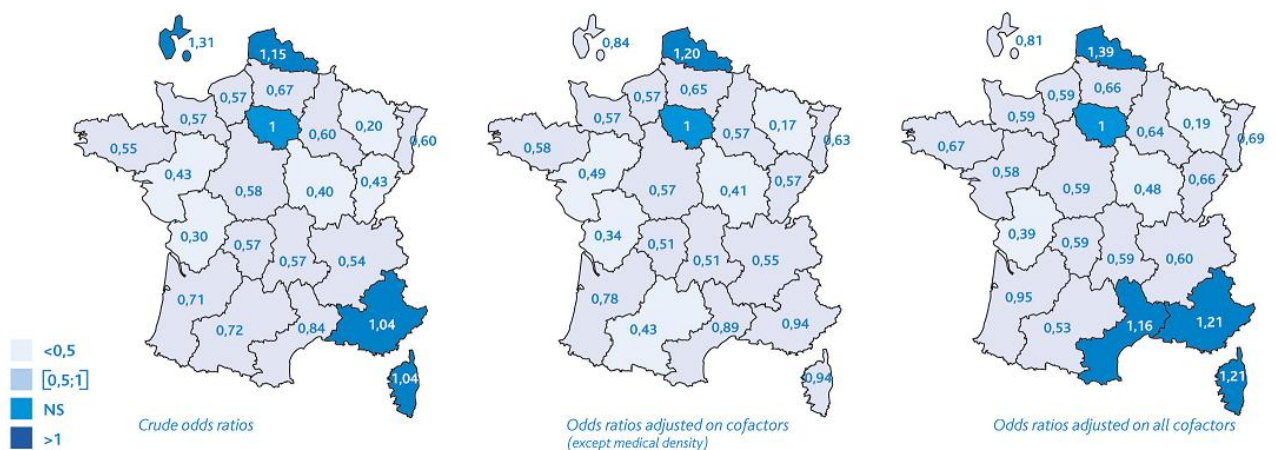
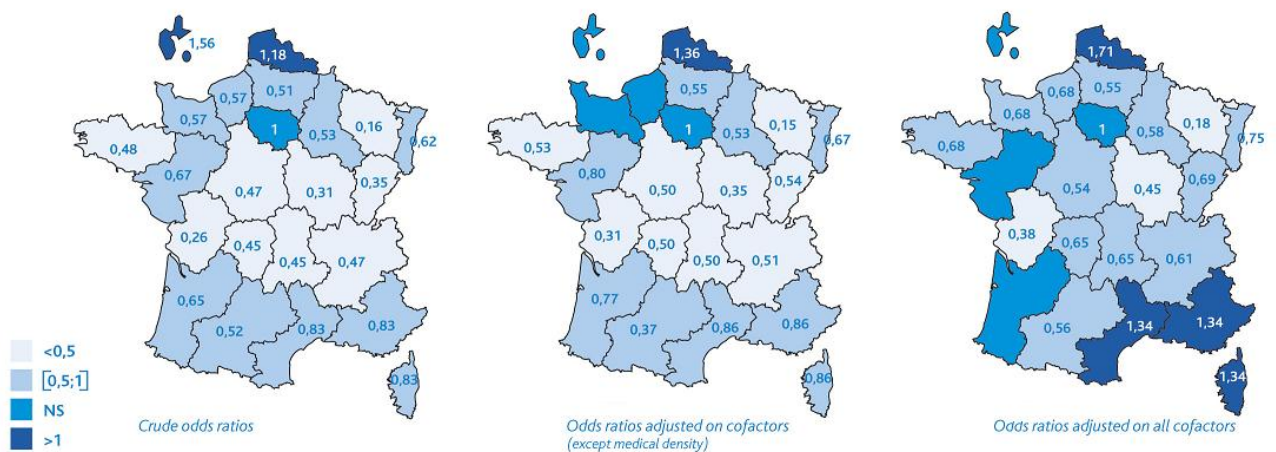


Figure 4 Crude and adjusted odds ratios for having insufficient vaccine coverage (subjects aged 60 years or more)



Comparison between the second and third maps showed that when medical density was included among cofactors odds ratios regional disparities were increased. Indeed, in most regions, odds ratios adjusted on all cofactors were higher : the impact of medical density on the need for preventive care is confirmed.

Discussion

Prevalences of unmet needs have been rarely estimated on french data and experience from people attending the french HCE provides new material. Since subjects were invited to perform preventive health examination, they did not attend examination with the view to treat a disease : estimations were made among general population and not unhealthy population. Our results are also strengthened by high statistical power due to the large sample size, so that risk estimates had little chance of random fluctuations and confidence intervals were of small magnitude. Another strength of our analysis is that objective measures of needs were available at individual level.

The study revealed that more than a third of subjects who came to an HCE in 2002-2003 had an unmet curative or preventive need. The risk of having unmet needs revealed to be significantly lower for women than for men except for the risk of having insufficient vaccine coverage people aged 60 years or more. Unmet needs appeared to be more frequent for subjects who had no complementary health insurance, who had a low education level or low occupational class. Having non-treated dental caries and insufficient vaccine coverage also proved to be more frequent for deprived subjects and people who did not live as a couple.

Increasing frequency of visits to a physicians or a dentist resulted in decreasing risks of having insufficient vaccine coverage or non-treated dental caries. These results confirmed that needs for medical care can either be unknown or not expressed, partly because of ignorance on treatments and services or because of an aversion or difficulties to access health-care services.

Hopefully, regions of southern France having high physicians' density were those where low prevalences of untreated high blood pressure were observed.

Similarly, low dentist density appeared to be associated with higher risk of having non-treated dental caries. Decreasing medical density resulted in increasing risks of having insufficient vaccine coverage but high rates of insufficient vaccine coverage were observed in the regions of southern France and Ile-de-France, despite a high medical density.

However, some limitations have to be discussed. The main limitation of our results is a possible selection bias of the study population which may hamper the generalization to the French population. Besides of administrative exclusions (people not affiliated to the general health insurance system), unpredictable biases could result from the "volunteer" bias since every examined person was invited to a HEC, not obliged to come. One could expect that people paying the more attention to their health would accept more frequently this invitation. If so, the actual prevalence of unmet needs would probably be higher than in the examined population. However, we observed significant results and since data were adjusted on socio-economic characteristics, the effect of selection bias should be reduced.

Conclusion

The results of the present study showed that HEC data can be a useful tool for a better understanding of the regional disparities in the prevalence of unmet needs and their relationship with access to care, possibly in implementing and evaluating public policies aimed at promoting preventive care as influenza vaccination.

The underlying idea of these policies is to focus health screening on the most deprived people in order to take care of their health problems or their health threatening risks and to promote preventive behaviours. In order to get a better understanding of determinants of unmet needs, we now have to look for relationships between those unmet needs (are the same individuals affected?) and to analyse the longitudinal changes in preventive behaviours, social and environmental factors and health indicators.

Reference List

- (1) Donabedian A. Aspects of Medical Care Administration. 1973.
- (2) Masseria C, Van Doorslaer E. Income-related inequality in the use of medical care in 21 OECD countries. 2005. Report No.: OECD Health Working Papers 14.
- (3) Van Doorslaer E, Puffer F. Equity in the use of physician visits in OECD countries: has equal treatment for equal need been achieved? In: Paris : OCDE, editor. Measuring Up : Improving Health System Performance in OECD Countries. 2002. p. 225-48.
- (4) Chaix B, Chauvin P. Les déterminants contextuels et spatiaux des modes de recours aux soins. 2004.
- (5) Chaix B, Merlo J, Chauvin P. Comparison of a spatial approach with the multilevel approach for investigating place effects on health: the example of healthcare utilisation in France. *J Epidemiol Community Health* 2005 Jun;59(6):517-26.
- (6) Robinson PG, Nadanovsky P, Sheiham A. Can questionnaires replace clinical surveys to assess dental treatment needs of adults? *J Public Health Dent* 1998;58(3):250-3.
- (7) Tervonen T, Knuuttila M. Awareness of dental disorders and discrepancy between "objective" and "subjective" dental treatment needs. *Community Dent Oral Epidemiol* 1988 Dec;16(6):345-8.
- (8) Vered Y, Sgan-Cohen HD. Self - perceived and clinically diagnosed dental and periodontal health status among young adults and their implications for epidemiological surveys. *BMC Oral Health* 2003 Jul 13;3(1):3.
- (9) Direction des Statistiques et des Etudes - CNAMTS. Le secteur libéral des professions de santé en 2002. CNAMTS, editor. [110]. 2004. Carnets statistiques.
Ref Type: Serial (Book,Monograph)