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ORIGINAL RESEARCH

Comparison of rural and urban French GPs' activity: a cross-sectional study

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ABSTRACT:

Introduction: In various countries, a shortage of general practitioners (GPs) and worrying health statistics on risk factors, morbidity and mortality have been observed in rural areas. However, few comparative data are available on GP activities according to their location. The aim of this study was to analyse French GP activities according to their rural or urban practice

location.
Methods: This study was ancillary to the *Eléments de la COnsultation en médecine GENérale* (ECOGEN) study, which was a cross-sectional, multicentre, national study conducted in 128 French general practices in 2012. Data were collected by 54 interns in training during a period of 20 working days from December 2011 to April 2012. GP practice location was classified as rural area, urban cluster or urban area. The International Classification of Primary Care (ICPC-2) was used to classify reasons for encounter, health problem assessments, and processes of care. Univariate analyses were performed for all dependent variables, then multivariable analyses for key variables, using hierarchical mixed-effect models.
Results: The database included 20 613 consultations. The mean yearly number of consultations per GP was higher in rural areas ($p<0.0001$), with a shorter consultation length ($p<0.0001$). No difference was found for GP sex ($p=0.41$), age ($p=0.87$), type of fees agreement ($p=0.43$), and type of practice ($p=0.19$) according to their practice location. Urban patients were younger, and there was a lower percentage of patients over 75 years ($p<0.001$). GPs more frequently consulted at patients' homes in rural areas ($p<0.0001$). The mean number of chronic conditions managed was higher in rural areas and urban clusters than in urban areas ($p<0001$). Hypertension ($p<0.0001$), type 2 diabetes ($p=0.003$), and acute bronchitis/bronchiolitis ($p=0.01$) were more frequently managed in rural areas than in urban clusters and areas. Health maintenance/prevention ($p<0.0001$) and no disease situations ($p<0.0001$) were less frequent in rural areas. Drug prescription was more frequent in rural areas than in urban clusters and areas ($p<0.0001$).
Multivariable analysis confirmed the influence of a GP's rural practice location on the consultation length ($p<0.0001$), the number of chronic conditions per consultation ($p<0.0001$) and the number of health maintenance/prevention situations ($p<0.0001$), and a trend towards a higher yearly number of consultations per GP ($p=0.09$).
Conclusion: French rural GPs tend to have a higher workload than urban GPs. Rural patients have more chronic conditions to be managed but are offered fewer preventive services during consultations. It is necessary to increase the GP workforce and develop cooperation with allied health professionals in rural areas.

Keywords:
chronic health problems, consultation length, France, general practice, prevention, workload.

FULL ARTICLE:

Introduction

Projections predict a shortage of nearly 400 000 doctors across the 32 countries of the Organization for Economic Co-operation and Development (OECD) in 2030, estimated at 21.6% of supply in the USA and 22.8% in France[1]. The shortage in doctor supply is often worsened by geographic imbalances[2], which in particular create disparities between rural and urban health care[3]. This shortage in rural areas is determined by personal, training and practice factors[4].

In 2015, the density of family physicians/general practitioners (GPs) was 2.5 per 1000 inhabitants in the USA and 3.3 per 1000 inhabitants in France, with unequal territorial distributions[5]. In the USA, there was a density ratio close to five to one between capitals and other areas; in France, there were 3.9 GPs per 1000 inhabitants practising in urban areas versus 2.7 in rural areas[5]. Although rural areas covered 97% of the USA and included 19% of the population in 2016[6], it was estimated in 2000 that only 9% of all GPs were practising in rural areas[7]. A similar trend was observed in France in 2012, as only 9% of GPs were practising in rural areas[8], which represented 78% of the territory and included 31% of the population[9]. Because of these disparities in the medical workforce, as well as transportation barriers, patients living in rural areas are exposed to inequalities in healthcare access, insofar as they usually visit a physician less often and later in the course of their illness than urban inhabitants do[7,10]. In France, priority zones have therefore been defined based on low accessibility to GPs[11]. These underserved areas represented approximately 6% of the French population in 2018[12].

In the USA, there are sharp differences between rural and urban inhabitants in the frequency of behavioural risk factors and leading causes of morbidity and mortality. Rural inhabitants are less likely to be non-smokers, maintain a normal body weight, and meet physical activity recommendations[13]. Rural areas have higher rates than urban areas for many chronic conditions, such as heart disease, stroke, hypertension, high hypercholesterolemia, cancers, diabetes, chronic obstructive pulmonary disease, arthritis, and depressive disorder[14]. In addition, mortality rates are higher in rural areas than in urban areas, including for heart disease and stroke, chronic lower respiratory disease, and cancers[15,16].

Beyond the differences in the epidemiology of health problems between rural and urban areas, few comparative data are available on GP activities according to their location. For example, in a study conducted in the USA in 1997, Probst et al found that, in rural practice, musculoskeletal and cardiovascular problems were more frequent, whereas clinical preventive services were less frequent[17]. Unfortunately, such studies were not replicated in other countries.

The aim of the current study was to analyse the activities of French GPs according to the location of their practice: rural or urban.

Methods

This study was ancillary to the French ECOGEN (*Eléments de la COnsultation en médecine GENérale*) study, which was a cross-sectional, multicentre, national study conducted in French general practice[18]. Its main objective was to describe the health problems managed in general practice and the associated reasons for encounter and processes of care.

Data collection

Data were collected by 54 interns in training, who acted as observers of 128 GP trainers. Data were initially collected in free text on a paper questionnaire during each consultation, during a period of 20 working days from December 2011 to April 2012. Any patient consulting at a GP's office or seen at home, and not refusing to participate, was included. Data collected for the patient and the consultation were sex, age, place of consultation (office or home), patient exemption status for low income, consultation length, health problem(s) managed, and the associated reasons for encounter and processes of care performed or planned. Data collected for each GP were sex, age, practice location (rural area, urban cluster or urban area), type of practice (solo or collective), fixed fees agreement (yes/no) and yearly number of consultations. Interns secondarily entered the data into a central database accessible on a dedicated server.

Data management

Reasons for encounter, health problem assessments, and processes of care were classified according to the International Classification of Primary Care (ICPC-2)[19]. GP practice locations were classified into three categories derived from the classification of the French National Institute of Statistics and Economic Studies (*Institut National de la Statistique et des Etudes Economiques,* INSEE), based on 2007 census data, using both the name of the commune and the zip code[20]. INSEE defines an urban space as a commune/district or a group of municipalities, which encompass in its territory a built-up area of at least 2000 inhabitants, where no dwelling is separated from the nearest by more than 200 metres; and each concerned municipality has more than half of its population in a built-up area. By definition, all the remaining communes are classified as rural. In addition, urban communes were subdivided into two categories: urban clusters (ie communes listing between 2000 and 50 000 inhabitants) and urban areas (ie communes of at least 50 000 inhabitants), including the Paris agglomeration (Appendix I).

Data analysis

Data were managed and analysed using SAS software (v9.4, SAS Institute; https://www.sas.com/fr_fr/software/sas9.html). Univariate comparisons were based on χ^2 tests for categorical variables and variance analyses for quantitative variables. Multivariable analyses were also performed for key dependent variables (GP yearly number of consultations, and consultation length, number of health maintenance/prevention situations, and number of chronic conditions per consultation), using linear regression models. These regression analyses used hierarchical mixed-effect models with random intercepts for physician effect and two levels when appropriate: the physician and the consultation. The threshold for statistical significance was defined as $p<0.05$.

Ethics approval

The ECOGEN study was approved by the National Data Protection Commission (*Commission Nationale de l'Informatique et des Libertés*, CNIL; No. 1 549 782) and the regional ethics committee (*Comité de Protection des Personnes Sud-Est IV*; No.L11-149). Authorisation for the use of ICPC-2 was obtained from Wonca.

Results

The database included 20 613 consultations. The mean number of consultations per GP per year was higher in rural areas than in urban clusters or urban areas ($p=0.04$). No difference was found for GP's sex ($p=0.41$), age ($p=0.87$), type of fees agreement ($p=0.43$), and type of practice ($p=0.19$) according to practice location (Table 1). In multivariable analysis, the mean number of consultations per GP per year tended to be higher in rural areas (5302.7) than in urban clusters (4902.6) or urban areas (4387.8) ($p=0.09$) (Table 2).

Patients consulting in urban areas were younger than those consulting in rural areas or urban clusters, and there was a lower proportion of patients over 75 years ($p<0.001$). The sex of patients did not differ according to GP practice location. In rural areas, patients less frequently benefited from fee exemptions, were more often visited at home ($p<0.0001$), and had a shorter mean consultation length ($p<0.0001$). The mean number of health problems assessed ($p<0.0001$) and reasons for encounter presented ($p<0.0001$) as well as the mean number of processes of care performed or planned ($p<0.0001$) were lower in rural and urban areas than in urban clusters. The mean number of chronic conditions was higher in rural areas and urban clusters than in urban areas ($p<0.0001$; Table 3). In multivariable analyses, the mean length of consultation was shorter in rural areas (17.02 minutes) than in urban clusters (17.88) or urban areas (19.18 ($p<0.0001$); and the mean number of chronic conditions was higher in rural areas (0.68 per consultation) and in urban clusters (0.70) than in urban areas (0.64) ($p<0.0001$) (Table 2).

Among the top 10 health problem assessments, hypertension ($p<0.0001$), type 2 diabetes ($p=0.003$), and acute bronchitis/bronchiolitis ($p=0.01$) were more frequently managed in rural areas than in urban clusters and areas. Conversely, health maintenance/prevention ($p<0.0001$) and no disease situations ($p<0.0001$) were less frequent in rural areas. The frequency of depressive disorders did not differ according to GP practice location ($p=0.09$; Table 4). Among the 17 body systems, cardiovascular ($p<0.0001$), musculoskeletal ($p<0.0001$), respiratory ($p<0.0001$), and ear ($p=0.005$) problems were more frequent in rural areas than in urban clusters and areas. Conversely, general health problems ($p<0.0001$), pregnancy and family planning problems ($p<0.0001$), social problems ($p<0.0001$), and blood and immune problems ($p=0.01$) were less frequently managed in rural areas and urban clusters than in urban areas (Table 5). In multivariable analysis, health maintenance/prevention situations were less frequently managed in rural areas (0.08 per consultation) than in urban clusters (0.16) or urban areas (0.18) ($p<0.0001$) (Table 2).

Among the top 15 processes of care performed by GPs, drug prescription was more frequent in rural areas than in urban clusters and areas ($p<0.0001$). Complete clinical examination was more frequently performed in rural areas ($p<0.0001$), contrary to partial

examination (p=0.0003). Educational processes (ICPC-2 code 58 p<0.0001 and ICPC-2 code 45 p<0.0001), administrative procedures (p=0.0005), and preventive immunisation/medication (p<0.0001) were less frequently performed in rural areas and urban clusters than in urban areas. The frequencies of referrals to a physician (p=0.32) or to another provider (p=0.92), of imaging prescriptions (p=0.33) and of dressings (p=0.48) did not differ according to GP practice location (Table 6).

Among the top 10 reasons for encounter, drug prescription was more frequent in rural areas and in urban clusters than in urban areas (p<0.0001). Cough (p=0.04), sneezing/nasal congestion (p=0.03), or a throat complaint (p=0.0021) were more frequent in rural areas than in urban clusters or areas (Table 7). The health issues managed during the consultation were less frequently raised by the GPs (p<0.0001) and the encounter more frequently concerned follow-ups (p<0.0001) in rural areas.

Table 1: General practitioner characteristics according to general practice location (n=128 GPs)

GP characteristic	Rural area (n=16)	Urban cluster (n=33)	Urban area (n=79)	p-value
Sex, *n* (%)				0.41
Male	12 (75.0)	24 (72.7)	49 (63.0)	
Female	4 (25.0)	9 (27.3)	30 (37.0)	
Age (years), mean±SD	51.7± 8.6	52.9±6.6	52.7±8.3	0.87
Age (years), *n* (%)				0.91
32–44	3 (18.7)	6 (18.2)	16 (20.2)	
45–54	7 (43.7)	11 (33.3)	25 (31.7)	
55–70	6 (37.5)	16 (48.5)	38 (48.1)	
Fixed fees agreement, *n* (%)				0.43
Yes	15 (93.7)	98 (97.0)	71 (89.9)	
No	1 (6.25)	2 (3.0)	8 (10.1)	
Type of practice, *n* (%)				0.19
Solo	6 (37.5)	5 (15.2)	16 (20.2)	
Collective	10 (62.5)	28 (84.8)	63 (79.8)	
Consultations/year/GP, mean±SD	5856.9±2087.3	5516.1±1906.5	4836.8±1571.8	0.04

GP, general practitioner. SD, standard deviation.

Table 2: General practitioner yearly number of consultations, and consultation length, number of health maintenance/prevention situations and number of chronic conditions according to general practice location in multivariable analyses (n=128 GPs and n=20 613 consultations)

Variable	Rural area	Urban cluster	Urban area	p-value
Consultations/year/GP, mean±SE†	5302.7±500.7	4902.6±434.3	4387.8±331.4	0.09
Consultation length (min), mean±SE¶	17.02±0.26	17.88±0.23	19.18±0.21	<0.0001
Number of chronic conditions/consultation, mean±SE¶	0.68±0.03	0.70±0.03	0.64±0.03	<0.0001
Number of health maintenance/prevention situations/consultation, mean±SE¶	0.08±0.02	0.16±0.01	0.18±0.01	<0.0001

† Analyses adjusted for GP's age, sex, fixed fees agreement and type of practice.
¶ Analyses adjusted for GP's age, sex, fixed fees agreement and type of practice, and for patient's age, sex, fee exemption status for low income and place of consultation.
GP, general practitioner. SE, standard error.

Table 3: Patient and consultation characteristics according to general practice location (n=20 613 consultations)

Characteristic	Rural area (n=2482)	Urban cluster (n=5662)	Urban area (n=12 469)	p-value
Sex, *n* (%)				0.07
Male	1050 (42.3)	2432 (43.0)	5136 (41.2)	
Female	1432 (57.7)	2230 (57.0)	7333 (58.8)	
Age (years), mean±SD	49.0±26.6	48.5±26.2	45.3±25.2	<0.001
Age (years), *n* (%)				<0.001
0–14	400 (16.1)	894 (15.8)	1943 (15.6)	
15–44	589 (23.7)	1402 (24.8)	3930 (31.6)	
45–74	983 (39.6)	2288 (40.4)	4841 (38.8)	
≥75	510 (20.5)	1078 (19.0)	1755 (14.0)	
Fee exemption status for low income, *n* (%)				<0.0001
Yes	51 (2.0)	212 (3.7)	649 (5.2)	
No	2431 (98.0)	5450 (96.3)	11 820 (94.8)	
Place of consultation, *n* (%)				<0.0001
GP's office	2201 (88.7)	5217 (92.1)	11 926 (95.6)	
Patient's home	281 (11.3)	445 (7.9)	543 (4.4)	
Consultation length (min), mean±SD	14.8±7.3	16.0±8.0	17.4±8.5	<0.0001
Number of chronic conditions, mean±SD	0.93±1.2	0.97±1.3	0.79±1.1	<0.0001
Number of health problems, mean±SD	2.1±1.4	2.4±1.7	2.2±1.4	<0.0001
Number of processes of care, mean±SD	4.6±2.6	4.9±2.9	4.8±2.7	<0.0001
Number of reasons for encounter, mean±SD	2.6±1.6	2.8±1.9	2.6±1.6	<0.0001

GP, general practitioner. SD, standard deviation.

Table 4: Top 10 health problem assessments according to general practice location (*n*=45 582)

Health problem assessment (ICPC-2 code)	Rural area (*n*=5187), *n* (%)	Urban cluster (*n*=13 402) *n* (%)	Urban area (*n*=26 993) *n* (%)	*p*-value
Health maintenance/prevention (A98)	381 (7.3)	1380 (10.3)	3233 (11.9)	<0.0001
Hypertension, uncomplicated (K86)	459 (8.8)	1048 (7.8)	1681 (6.2)	<0.0001
Upper respiratory infection, acute (R74)	232 (4.5)	520 (3.8)	1211 (4.4)	0.01
Lipid disorder (T93)	219 (4.2)	593 (4.4)	878 (3.2)	<0.0001
No disease (A97)	97 (1.9)	346 (2.5)	787 (2.9)	<0.0001
Depressive disorder (P76)	148 (2.8)	324 (2.4)	742 (2.7)	0.09
Diabetes, non-insulin dependent (T90)	145 (2.8)	354 (2.6)	591 (2.1)	0.003
Bronchitis/bronchiolitis, acute (R78)	103 (2.0)	191 (1.4)	403 (1.4)	0.01
Sleep disturbance (P06)	79 (1.5)	219 (1.6)	371 (1.3)	0.11
Hypothyroidism/myxoedema (T86)	88 (1.7)	189 (1.4)	368 (1.3)	0.17

ICPC, International Classification of Primary Care.

Table 5: Distribution of health problem assessments by body systems according to general practice location (*n*=45 582)

Health problem assessment (ICPC-2 code)	Rural areas (*n*=5187) *n* (%)	Urban clusters (*n*=13 402) *n* (%)	Urban areas (*n*=26 993) *n* (%)	*p*-value
Cardiovascular (K)	871 (16.7)	2020 (15.0)	3282 (12.1)	<0.0001
Musculoskeletal (L)	745 (14.3)	1739 (12.9)	3271 (12.1)	<0.0001
Respiratory (R)	716 (13.8)	1523 (11.3)	3389 (12.5)	<0.0001
General and unspecified (A)	621 (11.9)	2186 (16.3)	4764 (17.6)	<0.0001
Endocrine/metabolic and nutritional (T)	568 (10.9)	1590 (11.8)	2717 (10.0)	<0.0001
Psychological (P)	406 (7.8)	1062 (7.9)	2252 (8.3)	0.22
Digestive (D)	392 (7.5)	993 (7.4)	2160 (8.0)	0.09
Skin (S)	251 (4.8)	628 (4.6)	1290 (4.7)	0.88
Neurological (N)	128 (2.4)	307 (2.2)	708 (2.6)	0.13
Ear (H)	120 (2.3)	216 (1.6)	504 (1.8)	0.005
Urological (U)	76 (1.4)	223 (1.6)	474 (1.7)	0.31
Female genital (X)	64 (1.2)	211 (1.5)	441 (1.6)	0.10
Male genital (Y)	64 (1.2)	173 (1.2)	322 (1.1)	0.70
Eye (F)	46 (0.8)	142 (1.0)	284 (1.0)	0.53
Pregnancy, childbearing, family planning (W)	43 (0.8)	132 (0.9)	465 (1.7)	<0.0001
Social problems (Z)	43 (0.8)	158 (1.1)	411 (1.5)	<0.0001
Blood, blood-forming organs, and immune mechanism (B)	33 (0.6)	99 (0.7)	25 (0.9)	0.01

ICPC, International Classification of Primary Care.

Table 6: Top 15 processes of care according to general practice location (*n*=98 846)

Process of care (ICPC-2 code)	Rural areas (*n*=11 342) *n* (%)	Urban clusters (*n*=27 927) *n* (%)	Urban areas (*n*=59 577) *n* (%)	*p*-value
Medication/prescription/renewal (50)	3887 (34.2)	8986 (32.1)	16 927 (28.4)	<0.0001
Medical examination/health evaluation, partial (31)	2940 (25.9)	7682 (27.5)	16 548 (27.7)	0.0003
Medical examination/health evaluation, complete (30)	917 (8.0)	1816 (6.5)	3480 (5.8)	<0.0001
Therapeutic counselling/listening (58)	627 (5.5)	1239 (4.4)	3794 (6.3)	<0.0001
Blood test (34)	520 (4.5)	1326 (4.7)	2596 (4.3)	0.03
Administrative procedure (62)	44 (3.9)	1053 (3.7)	2570 (4.3)	0.0005
Observation/health education/advice/diet (45)	316 (2.7)	1125 (4.0)	2883 (4.8)	<0.0001
Referral to physician/specialist/clinic/hospital (67)	293 (2.5)	741 (2.6)	1660 (2.7)	0.32
Diagnostic radiology/imaging (41)	251 (2.2)	650 (2.3)	1445 (2.4)	0.33
Physical medicine/rehabilitation (57)	155 (1.3)	304 (1.0)	533 (0.8)	<0.0001
Preventive immunisation/medication (44)	132 (1.1)	342 (1.2)	1095 (1.8)	<0.0001
Refer to other provider/nurse/therapist/social worker (66)	77 (0.6)	181 (0.6)	398 (0.6)	0.92
Microbiological/immunological test (33)	66 (0.5)	382 (1.3)	721 (1.2)	<0.0001
Dressing/pressing/compression/tamponade (56)	54 (0.4)	110 (0.3)	240 (0.4)	0.48
Urine test (35)	42 (0.3)	123 (0.4)	179 (0.3)	0.004

ICPC, International Classification of Primary Care.

Table 7: Top 10 reasons for encounter according to general practice location (*n*=54 690)

Reason for encounter (ICPC-2 code)	Rural areas (*n*=6533) *n* (%)	Urban clusters (*n*=15 936) *n* (%)	Urban areas (*n*=32 221) *n* (%)	*p*-value
Medication/prescription/renewal (50)	1666 (25.5)	4346 (27.2)	5600 (17.3)	<0.0001
Encounter initiated by provider (64)	2815 (4.3)	1537 (9.6)	3341 (10.3)	<0.0001
Follow-up encounter (63)	474 (7.2)	794 (4.9)	1850 (5.7)	<0.0001
Cough (R05)	363 (5.5)	657 (4.1)	1582 (4.9)	0.04
Result test/procedure (60)	182 (2.7)	675 (4.2)	1385 (4.2)	<0.0001
Administrative procedure (62)	165 (2.5)	412 (2.5)	1043 (3.2)	<0.0001
Fever (A03)	179 (2.7)	391 (2.4)	843 (2.6)	0.26
Sneezing/nasal congestion (R07)	162 (2.4)	263 (1.6)	683 (2.1)	0.03
Throat symptom/complaint (R21)	130 (1.9)	293 (1.8)	546 (1.6)	0.0021
Preventive immunisation/medication (44)	106 (1.6)	237 (1.4)	591 (1.8)	<0.0001

ICPC, International Classification of Primary Care.

Discussion

GP sex, age, type of fee agreement, and type of practice did not

differ according to their practice location. Those practising in rural areas tended to provide a higher number of shorter consultations and perform more home visits. Patients in rural areas were older and benefited less often from fee exemption for low income. GPs more frequently managed chronic conditions in rural areas and urban clusters than in urban areas. Health maintenance/prevention and no disease situations were less frequent, whereas hypertension and type 2 diabetes were more frequent, in rural areas than in urban clusters and areas. However, the frequency of depressive disorders did not vary according to GP practice location. Cardiovascular and musculoskeletal problems were more frequent in rural areas than in urban clusters and areas. In rural areas, GPs more frequently performed complete clinical examinations and less frequently partial examinations, and prescribed drugs more often. The influence of a GP's rural practice location on the consultation length, the number of chronic conditions per consultation, and the number of health maintenance/prevention situations was confirmed after controlling for the characteristics of GPs and consultations.

In the present study, rural GPs did not differ from urban GPs according to their characteristics (age and sex) and the characteristics of their practice (fixed fees agreement and type of practice). In contrast, rural GPs in the USA were more often men than urban GPs and worked mostly in solo practice[21]. French GPs practising in rural areas tended to have a higher workload, comprising nearly an extra 1000 consultations per year (ie 17.5% higher), than GPs in urban areas. Such a trend was also found in a previous declarative French study[22]. The length of consultation was shorter by roughly 3 minutes (ie 15.5% lower) in rural areas than in urban ones, which is consistent with data from European countries and the USA, and can be explained by a higher workload in rural areas[17,23]. As observed previously in the USA[24] and in Germany[25], French rural GPs also provided more home visits than urban GPs, probably because rural patients tend to be older and have a higher number of chronic conditions[25,26].

Indeed, the management of chronic conditions was more frequent (by 11.7%) in rural areas than in urban areas, especially for hypertension and diabetes, as was also observed in the USA[14] and in Australia[27]. In addition to the age effect, this trend could be favoured by a higher frequency of smoking, obesity, and poor physical activity of people living in rural areas[13,28]. Consequently, cardiometabolic complications and mortality are higher in rural areas[29,30]. Musculoskeletal problems were also more frequent in rural than in urban areas, as has also been reported for the USA[17,24]. This could be related to the older age of rural patients, in particular regarding osteoarthrosis. The finding of a similar frequency of depression in rural and urban areas is consistent with the results of a systematic review, apart from in the USA where the rate of depression was higher in rural areas[31].

In the present study, GPs practising in rural areas delivered 31.7% fewer preventive services. Rural GPs have reported that they usually do less prevention, such as immunisation, screening[32], or prevention of diabetes complications[33]. This finding is not consistent with results from a previous study, which showed more cardiovascular prevention and vaccination being carried out in rural French general practice[34]. However, the data in that study were collected in 2003, before a gatekeeping system was implemented in France; this reform decreased visits to specialists and to multiple GPs[35], which may have favoured the delivery of prevention services by the gatekeeper GPs, especially in urban areas. The lack of prevention observed in rural areas can be due to rural GPs' higher workload, the greater distance from an inhabitant's home to a GP's office, and a lower consultation rate on behalf of rural inhabitants than of urban ones[36]. It may also be influenced by a higher frequency of walk-in consultations for acute health problems in rural areas, although this is not documented[37]. Such differences in preventive care access may affect the population's life expectancy, which is now lower in rural areas than in urban areas in the USA[38]. Regarding cancer, for instance, people who live remotely from cities have more advanced disease at diagnosis and poorer chances of survival[39]. Among processes of care, rural GPs prescribed more drugs than urban GPs did. This may result from the higher frequency of chronic diseases in rural areas[27]. GPs also provided more general medical examinations in rural areas but more partial medical examinations in urban areas. Conversely, in the USA, GPs more often perform general medical examinations in urban areas than in rural areas[17,40]. Of note, however, the definition of a general versus partial examination probably varies across studies.

Limitations

GP practice location was used as a proxy for the patient's living place, which can generate some bias for patients who live far from their GP's practice. All participating GPs were university trainers, who have been recognised globally as representative in terms of sociodemographics and patients. However, they perform better than non-trainers in some preventive care, which should not have substantially affected these findings[41]. Data on the severity and emergency levels of health problems managed by GPs, which may differ between rural and urban areas and influence GPs' view of their practice, could not be recorded[42,43]. Since the study data were collected in 2012 and the accessibility of GPs has tended to decrease since then[12], it is likely that the findings would be confirmed and possibly surpassed almost a decade later.

Implications

The high workload and lack of preventive services observed in French general practice is probably related to a shortage of GPs in rural areas[5]. This constitutes a public health issue because the supply of primary care physicians is associated with a population's life expectancy[44]. Since the labour market for health professionals relates to the country's education and healthcare system[45], an integrated approach is increasingly required to adapt the healthcare workforce to the population's health needs[46] and to address imbalanced health coverage[47]. Strategies to reduce physician shortages in rural regions should also target their determinants, ie the international environment, the rural environment, the work environment, and the individual[48]. Several interventions targeting the work environment, including the training and the working conditions of GPs, have been carried out in France. Rural trainers may help to reduce the shortage in rural

general practice, as medical students who have experienced rural training are more likely to become rural GPs[49]. This strategy may already be underway in France because GP trainers tend to be over-represented in rural areas[41]. Collaborative practice and interprofessional training could also reduce or compensate for the lack of GPs and improve the provision of preventive services and the management of chronic conditions[50,51]. Improvements in the provision of healthcare services expected from these strategies should be monitored[11].

Conclusion

French rural GPs tend to have a higher workload with more consultations per year and shorter consultations than urban GPs. Rural patients have more chronic conditions to be managed and are offered fewer preventive services during their consultation. It is necessary to increase the GP workforce and develop cooperation with allied health professionals in rural areas.

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APPENDIX I:

Classification of the 128 general practitioners according to their practice location

TU10[†]	GPs (*n*)	Practice location	GPs (*n*)
Rural commune	16	Rural area	16
Urban unit of less than 5000 inhabitants	12	Urban cluster	33
Urban unit of 5000–9999 inhabitants	9		
Urban unit of 10 000–19 999 inhabitants	8		
Urban unit of 20 000–49 999 inhabitants	4		
Urban unit of 50 000–99 999 inhabitants	9	Urban area	79
Urban unit of 100 000–199 999 inhabitants	8		
Urban unit of 200 000–1 999 999 inhabitants	40		
Paris agglomeration	22		

[†] Urban range according to the French National Institute of Statistics and Economic Studies, 2010. https://www.insee.fr/fr/information/2115018
GP, general practitioner.