Access to general practitioner services: the disabled elderly lag behind in underserved areas

Basile Chaix¹, Paul J. Veugelers², Pierre-Yves Boëlle³, Pierre Chauvin¹

Background: Several studies have shown that people living in areas underserved in physicians have reduced odds of consulting. However, beyond the magnitude of this effect averaged for the whole population, policymakers need to know whether specific subgroups faced with transportation difficulties, such as the elderly and especially the disabled elderly, have a particularly restricted access to physicians when residing in underserved areas. Methods: The study sample, representative of the French population aged 18–75 in 1999, comprised 12 405 individuals. Multilevel Poisson models were used to investigate the impact of the area-level density of general practitioners (GPs) on the number of GP consultations reported over the previous 12 months. Results: The mean number of GP consultations over the previous 12 months was 3.8 (S.D. = 4.9). Multivariate analyses indicated that living in areas underserved in GPs lead to a greater reduction in primary care utilization for the elderly, and especially for the disabled elderly, than for younger age groups. The disabled elderly had 244% more GP consultations (95% CI: +79%, +562%) when they lived in areas with high versus low GP density (defined with the 10th and 90th percentiles as cut-offs). Conclusion: If further research confirms our findings, this increasingly disturbing public health issue in industrialized countries where populations are ageing will require priority policy measures. Ensuring that elderly people living in underserved areas have adequate access to primary care may prevent future hospitalizations, use of home care services and institutionalization.

Keywords: access to care, frail elderly, geography of health, primary health care

In France and in other Western industrialized countries, several studies have shown that the uneven distribution of physicians throughout the country leads to variations in the rate of consultations.¹,² Since the elderly have special transport problems because of their impaired level of mobility,³,⁴ their access to physician services may be more sharply reduced than average in areas where physician availability is low. The validation of this hypothesis would highlight an increasingly disturbing public health issue in industrialized countries where populations are ageing. Implementing policies to address this public health issue would not only be requisite for attaining greater equity in access to healthcare; it may also be cost-efficient since ensuring that the elderly have regular access to physicians may prevent future hospitalizations, use of home care services and institutionalization.⁵–⁸

Very few studies have adequately addressed this public health issue despite its importance. Several studies have examined whether the access of the rural elderly to physician services is more restricted than their urban counterparts.⁹,¹⁰ However, since low physician availability is also often reported in deprived urban areas,¹¹ the rural/urban difference cannot be thought of as an adequate proxy of physician availability. Closer to our topic, one US study has reported that Medicare beneficiaries (aged 65 or over) had a higher probability of using mental health specialty care when they lived in counties with a higher density of psychiatrists.¹² However, as the magnitude of this effect was not estimated for the non-elderly, it was not possible to conclude whether the density effect only affected the elderly or the entire population in the same way. This information, which when lacking makes it hard to tailor an adequate public health response, was provided in a German study: the rate of outpatient utilization of psychiatric facilities was found to be significantly higher when the distance from patients’ place of residence to the facility was short, and this association was about three times stronger among patients over age 75.¹³ However, this finding was based on univariate analyses, and potential confounders of the distance effect, such as the individual socioeconomic status or the rural/urban environment of residence, were not considered.

While addressing these shortcomings, we chose to focus on access to primary care. Because the regular access to primary care services allows for a continuity of care and a global management of patient health, it is crucial to maintain health of the elderly over the long term, and thus may contribute to reducing the odds of future hospitalization, use of home care services or institutionalization.⁵,⁷,¹³

As in most European countries,¹⁴,¹⁵ the elderly French are unlikely to face major income-related barriers in their access to primary care. Indeed, every legal resident in France is entitled to basic health coverage. User charges that are not reimbursed by the national Social Security (€6 for a GP consultation) are refunded by supplementary elective insurance schemes (in 2000,¹⁶ 93% of the population carried this extra insurance). However, geographical variations in the density of GPs may lead to inequity of access to primary care. It would be warranted to implement policies to address the issue of the disparities in the availability of primary care services if the whole population were found to be affected to a certain extent, or alternatively if certain subgroups had dramatically reduced odds of using primary care in underserved areas. Accordingly, to identify the top priority subgroups that should be targeted by a policy addressing this public health issue, we investigated two questions. Our first

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objective was to examine whether living in an area underserved by GPs leads to a greater restriction in access to primary care for the elderly than for younger age groups. Secondly, we tested whether living in an area underserved by GPs affects the whole elderly population, or only the mobility impaired, who may suffer specifically from this residential disadvantage. Beyond the size of the medical density effect averaged for the whole population, it is particularly important to quantify the magnitude of this effect for the subgroups that are expected to be particularly at risk, to identify major situations of underutilization that would require priority interventions.

**Methods**

**Data sources**

We used data collected in 1999 by the French National Institute for Prevention and Health Education (INPES) through the Baromètre Santé survey, a two level (households, individuals) random sample telephone survey (in each selected household one individual was randomly picked for an interview). The response rate was 0.69. The study sample included 12 405 individuals aged 18–75. Each individual reported the number of consultations with GPs he or she had had over the previous 12 months (office visits or house calls) as well as socio-demographic characteristics. We also considered the 324 sub-departmental administrative areas and computed a posteriori by the INPES to ensure that the sample was representative of the French population.

The National Sickness Insurance Fund provided us with the number of GPs per 100 000 inhabitants (range: 69–135) in each of the 95 administrative French departments (henceforth designated as areas of residence). To verify that the departments were homogeneous with respect to medical density, we computed the intra-department correlation coefficient, which measures the correlation of GP density between sub-departmental areas belonging to the same department.[15] This coefficient was very high (equal to 0.50) and highly significant (P < 0.0001).

**Statistical analysis**

We first used the non-parametric Jonckheere–Terpstra test[19] (implemented with SAS, version 8.02, SAS Institute, Cary, USA) to examine whether there was a monotonic relationship between the number of GP consultations reported over the previous 12 months and the area-level number of GPs per 100 000 inhabitants (first divided into quartiles).

For the disabled elderly, or the elderly being at risk, we used a fully adjusted model fitted to the whole sample, interaction effects indicated that the impact of the area-level density of GPs was significantly stronger for individuals in the 60–69 age group than for those in the under 60 age group, and still stronger for those in the 70–75 age group (results not shown). When the model was fitted for each age group separately, the interaction term disability × density of GPs was only found to be strongly significant for individuals in the 70–75 age group, indicating a stronger effect of the density of GPs for the disabled versus the non-disabled in this age group (results not shown).

Analyses stratified by disability × age groups (see table 2) confirmed that the disabled elderly (age 70–75) had a markedly higher number of GP consultations when they lived in areas with medium GP density (+115%, 95% CI:+21%, +282%) or high GP density (+244%, 95% CI:+79%, +562%) versus low GP density. Such a strong effect was not found in any other group. As indicated in the model for the disabled elderly (table 3), the area-level unexplained variations diminished by 27% when the contextual variables (type of municipality of residence, gross domestic product per capita, and density of GPs) were added to the model containing individual-level variables. At each step, the area-level residuals were estimated. These residuals were plotted on figure 2 (where they are represented in ascending order from left to right). This graph shows that the variance of the area-level residuals decreased when the contextual variables were introduced into the model.

The disabled elderly did not have a higher number of consultations of specialists when they lived in areas with a high GP density versus low GP density (results not shown).
Table 1 List of the variables used as adjustment factors in the models

<table>
<thead>
<tr>
<th>Variable</th>
<th>Type of variable</th>
<th>Categories of the qualitative variable/ unit of the quantitative variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>Qualitative</td>
<td>Less than 30; 30–44; 45–59; 60–69; 70–75</td>
</tr>
<tr>
<td>Gender</td>
<td>Qualitative</td>
<td>Male; female</td>
</tr>
<tr>
<td>Physical health (Duke scale)</td>
<td>Quantitative</td>
<td>A score from 0 to 100 (a high score indicates better health)</td>
</tr>
<tr>
<td>Mental health (Duke scale)</td>
<td>Quantitative</td>
<td>A score from 0 to 100 (a high score indicates better health)</td>
</tr>
<tr>
<td>Perceived health (Duke scale)</td>
<td>Quantitative</td>
<td>A score from 0 to 100 (a high score indicates better health)</td>
</tr>
<tr>
<td>Disability (Duke scale)</td>
<td>Quantitative</td>
<td>A score from 0 to 100 (a high score indicates greater dysfunction)</td>
</tr>
<tr>
<td>Chronic disease status</td>
<td>Qualitative</td>
<td>Reporting no chronic disease; reporting a chronic disease</td>
</tr>
<tr>
<td>Disability</td>
<td>Qualitative</td>
<td>Reporting no handicap; reporting a handicap leading to functional limitations</td>
</tr>
<tr>
<td>Marital status</td>
<td>Qualitative</td>
<td>Married; never married; divorced; widowed</td>
</tr>
<tr>
<td>Educational achievement</td>
<td>Qualitative</td>
<td>University; secondary school; primary school or less; still at school</td>
</tr>
<tr>
<td>Employment status</td>
<td>Qualitative</td>
<td>Full-time employment; part-time employment; subsidized employment; other</td>
</tr>
<tr>
<td>Occupation</td>
<td>Qualitative</td>
<td>Upper white-collar worker; intermediate; low white-collar worker; blue-collar worker; farmer; craftsman-shopkeeper</td>
</tr>
<tr>
<td>Household income per capita b</td>
<td>Qualitative</td>
<td>Over €1351 per person; €1101–1350; €611–1100; ≤ €610 or less</td>
</tr>
<tr>
<td>Type of municipality of residence</td>
<td>Qualitative</td>
<td>Large city (population over 200,000); medium sized town (≥ 20,000–200,000); small town (≥ 2000–20 000); rural municipality</td>
</tr>
<tr>
<td>Area-level gross domestic product per capita</td>
<td>Qualitative</td>
<td>First quartile; second quartile; third quartile; fourth quartile</td>
</tr>
</tbody>
</table>

| a: The category of reference is in bold. 
| b: Monthly household income was divided by the number of units in the household (estimated with the method of the Organisation for Economic Cooperation and Development). |

Discussion

To our knowledge, our study is the first to examine whether living in an area underserved in GPs leads to a greater restriction in the access to primary care for the elderly and especially for the disabled elderly than for younger age groups. Behind a moderate effect of the GP density for the whole population, we found that the disabled elderly were dramatically affected in underserved areas. If our findings can be replicated in other industrialized countries, addressing this public health issue through specific policies will have to be given priority.

Limitations of the study and potential biases

As the study sample consisted of individuals aged 18–75, we were unable to assess the impact of living in an area with low GP density for individuals over 75. Additional investigation is therefore required to examine whether the magnitude of the medical density effect on access to primary care further increases with age beyond 75 for individuals not living in institutions.

We must consider whether potential biases may account for the strong effect of the area-level GP density, which was found among the oldest (70–75) disabled in our sample. First, it may be argued that this effect stemmed partly or entirely from a selective migration bias which would occur if individuals with significant health concerns and a resulting high consumption of GP consultations moved from low to high medical density areas. However, this bias is unlikely here since we adjusted for a wide set of health indicators. Secondly, GP consultations were self-reported rather than drawn from medical records. However, since there is no reason to suspect that consultations were particularly underreported in low medical density areas, the effect of the GP density is unlikely to result from a measurement error.
Main findings

The extent to which living in an area with low GP density leads to a reduction in the number of GP consultations reported over the previous 12 months increased with age. Moreover, for the oldest (70–75) individuals in the study sample, we found that the medical density effect was mainly attributable to the disabled in this particular group. Therefore, and after adjustment for a wide set of sociodemographic and health variables, our main finding is that the disabled elderly reported a markedly lower number of GP consultations when they lived in an area with low GP density.

This finding raises the following question: can we interpret the lower reported number of GP consultations for the disabled elderly living in underserved areas in terms of underconsultation (underconsultation being defined as a lower use of primary care services than would be recommended based on healthcare needs)? Even if the kind of study undertaken here is not appropriate to decide whether a difference of use between two groups is attributable to underconsultation in one of them or overconsultation in the other, some arguments can be put forward in support of the hypothesis of underconsultation in low density areas. In areas with a medium level of medical density (80% of the sample), the disabled elderly should not be suspected of overconsulting, since they had slightly fewer GP consultations than individuals under 30 after adjustment for sociodemographic and health variables (−10%, 95% CI: −3%, −16%, results not shown in tables). Therefore, in underserved areas where the disabled elderly consulted significantly fewer

Figure 1 Mean number of consultations with general practitioners (GPs) over the previous 12 months according to the area-level density of GPs, France, 1999

Table 2 Effect of the area-level density of general practitioners (GPs) on the number of GP consultations reported over the previous 12 months in all age x disability status groups separately, France, 1999

<table>
<thead>
<tr>
<th>Percent differences *(95% CI)</th>
</tr>
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<tbody>
<tr>
<td>Both</td>
</tr>
<tr>
<td>In the under 60 age group</td>
</tr>
<tr>
<td>Low density areas</td>
</tr>
<tr>
<td>Medium density areas</td>
</tr>
<tr>
<td>High density areas</td>
</tr>
<tr>
<td>In the 60–69 age group</td>
</tr>
<tr>
<td>Low density areas</td>
</tr>
<tr>
<td>Medium density areas</td>
</tr>
<tr>
<td>High density areas</td>
</tr>
<tr>
<td>In the 70–75 age group</td>
</tr>
<tr>
<td>Low density areas</td>
</tr>
<tr>
<td>Medium density areas</td>
</tr>
<tr>
<td>High density areas</td>
</tr>
</tbody>
</table>

a: Adjusted for age, gender, Duke Health Profile scores, chronic disease status, disability, marital status, education, employment status, occupation, income, type of municipality of residence and area-level gross domestic product per capita.
b: Low density areas contain 10%, medium density areas contain 80% and high density areas contain 10% of the population, with cut-offs equal to 73 and 115 GPs per 100,000 inhabitants.
times than in areas with medium GP density, the disabled elderly may be expected to underconsult to a certain extent: in these underserved areas, they had 48% fewer consultations over the previous 12 months (95% CI: 24%, 66%) than individuals under 30, after adjustment for health needs and sociodemographic factors (results not shown in tables).

It is important to note that the medical density effect among the disabled elderly is not confounded either by the type of municipality of residence (rural or urban) or by the global wealth in the area of residence since our models were adjusted for such potential confounders. Whereas living in a rural municipality versus a large city had no impact on access to primary care, living in an area underserved in GPs was a barrier to the access to primary care for the disabled elderly.

### Implications for policy, practice and research

It is important to verify whether our findings can be replicated in other industrialized countries. In countries where GP density is lower than in France or where a markedly smaller percent of patient–physician contacts takes place at patients’ homes, living in an area underserved in GPs may affect the access of the elderly to primary care to a greater extent than in France. On the other hand, additional studies comparing the access to care of the elderly and the non-elderly would be required for a more comprehensive insight into the interrelated impact of the personal ability to move, the availability of transport means (car, public transport) and the availability of healthcare services.

Several policies may be suggested for implementation. A first option would be a policy aimed at reducing geographic disparities in GP density, which have long prevailed in France. For instance, financial incentives for physicians to set up their practice in low medical density areas may be suggested, but some analysts have warned that this may not be sufficient. It has therefore recently been suggested that a regulation of the place where physicians set up their practice may be required. Another different type of policy among other possibilities would be a programme specifically targeted at the disabled elderly living in underserved areas. House calls for health checks may be offered to the disabled elderly living in underserved areas, who would have been identified as underconsulting by the local social services, and approaches used in the British annual health checks of the over 75s to ensure that a high proportion of the elderly had a check should be considered (invitation letter to undergo a check, follow-up of non-responders by a telephone call or a visit).

Our finding that living in an underserved area affected to a significant extent only the disabled elderly aged 70 or over, namely a small proportion of the population, should not be regarded as sufficient evidence that a global policy aimed at reducing geographic disparities in the availability of primary care services is unwarranted. Indeed, our analysis stratified by age and disability status may have been unable to identify some other subgroups that may benefit from this policy, such as subgroups with other mobility problems (with no car for example) or with specific needs for regular follow-ups. More broadly, choosing the requisite intervention should be based on a comparative analysis of the cost-effectiveness of each option.

### Table 3

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Disability Status</th>
<th>Individual-level model (a)</th>
<th>Model including contextual variables (b)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 60</td>
<td>Disabled</td>
<td>0.110 (0.021)***</td>
<td>0.114 (0.023)***</td>
</tr>
<tr>
<td></td>
<td>Non-disabled</td>
<td>0.019 (0.004)***</td>
<td>0.018 (0.004)***</td>
</tr>
<tr>
<td>60–69</td>
<td>Disabled</td>
<td>0.161 (0.037)***</td>
<td>0.177 (0.042)***</td>
</tr>
<tr>
<td></td>
<td>Non-disabled</td>
<td>0.057 (0.013)***</td>
<td>0.053 (0.013)***</td>
</tr>
<tr>
<td>70–75</td>
<td>Disabled</td>
<td>0.188 (0.052)**</td>
<td>0.138 (0.044)*</td>
</tr>
<tr>
<td></td>
<td>Non-disabled</td>
<td>0.096 (0.022)**</td>
<td>0.093 (0.023)**</td>
</tr>
</tbody>
</table>

\(a\): The individual-level model included age, gender, Duke Health Profile scores, chronic disease status, disability, marital status, education, employment status, occupation and income.

\(b\): The contextual model further included type of municipality of residence, area-level gross domestic product per capita and area-level density of general practitioners.

\(P < 0.01; \text{**} P < 0.001; \text{***} P < 0.0001.\)

\(\text{The French departments ordered from left to right by increasing value of the residual.}\)
Therefore, recommending a definite policy is beyond the scope of the present study.

**Conclusion**

Our study suggests that the elderly combining a personal disadvantage (impaired mobility) with a residential disadvantage (living in an underserved area) have a dramatically reduced access to primary care. Therefore, if further research confirms our findings, policymakers will be faced with a disturbing public health issue in Europe and North America, even more so as the elderly are a growing fraction of the population. This would justify the high priority rollout of policy measures to ensure that the elderly have adequate access to primary care, which may prevent future hospitalizations, use of home care services and institutionalization.

**Acknowledgements**

We gratefully thank the National Institute for Prevention and Health Education, which provided the data for the study. B.C. carried out this work with a doctoral grant, and with a grant from the French Ministry of Research (TTT027). The project was supported by the ‘Avenir 2002’ programme of INSERM (the French National Institute of Health and Medical Research).

**Key points**

- Since the elderly have special transport problems because of their impaired level of mobility, their access to physician services may be more sharply reduced than average in areas where physician availability is low.
- Behind a moderate effect of the density of GPs for the whole population, the disabled elderly reported a markedly lower number of consultations when they lived in an area with low density of GPs, after adjustment for sociodemographic and health variables.
- Confirmation of our findings in future studies would justify the rollout of policy measures to ensure that the elderly have an adequate access to primary care, which may prevent future hospitalizations, use of home care services and institutionalization.

**References**