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Lower utilisation of primary, specialty, and preventive care services by individuals residing with persons in poor health

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Background: Since household time and financial resources for healthcare are primarily spent for those household members with the most urgent health needs, individuals residing with persons in poor health may be at risk of underusing healthcare services. We examined whether they had a lower use of primary, specialty, and preventive care than individuals who did not reside with persons in poor health. **Methods:** Data collected in 2000 from a representative sample of 8,210 French individuals aged 18 years and older from 3,810 households were analysed with logistic regression models adjusted for health, demographic, and socioeconomic variables. **Results:** We found that individuals residing with 1 other survey respondent had a higher risk of not using primary care, specialty care, and preventive care in the 12 months preceding the study when the health status of the other survey respondent was poorer (fair or alternatively poor vs. good). Furthermore, individuals residing with 2 other survey respondents had a higher risk of not using primary care, specialty care and preventive care in the 12 months preceding the study when they resided with a higher number of respondents in fair or poor health (1 or alternatively 2 vs. 0). **Conclusion:** The lower use of health services by individuals residing with persons in poor health may signal a need for health practitioners to broaden the scope of care beyond their patients, and for policymakers to consider the long term impact of this situation on the healthcare system.

Keywords: Family caregivers, family health, health service use.

Key-points:

- Assuming that household time and financial resources for healthcare are primarily spent for those household members with the most urgent health needs, we examined whether individuals residing with persons in poor health have a lower use of primary, specialty, and preventive care than people who have not been cast in such a situation.
- Using French survey data, we found that people residing with persons in poorer health or with a higher number of persons in poor health had a lower use of primary, specialty, and preventive care.
- The lower use of health services by individuals residing with persons in poor health may signal a need for health practitioners to broaden the scope of care beyond their patients, and for policymakers to consider the long term impact of this situation on the healthcare system.

On one hand, medical advances have enabled people with serious and chronic illness to survive longer despite their health problems.¹ On the other hand, in recent years, the healthcare systems of many Western countries have experienced trends towards shortened hospital stays and expanded outpatient care services.²⁻⁵ These recent changes have made living with persons in poor health a common experience. It is well known that many individuals residing with persons in poor health play an important part in healthcare delivery as family caregivers. Increased risks of stress,^{1,6-14} distress,^{2,3} depressive symptoms,^{1,2,12,14-19} and poor physical health^{2,4,12,17,19,20} have been reported for these family caregivers, and have often been attributed in the literature to the hardship of the caregiving activity. Public health researchers have extensively investigated the utilisation patterns of the services providing support to family caregivers.^{5,21,22} However, few studies have examined whether individuals residing with persons in poor health actually receive adequate healthcare for their own health concerns. Since household time resources^{1,2,6,9,23} and financial resources^{1,11,24} for healthcare are primarily spent for those household members with the most urgent health needs, individuals residing with persons in poor health may be at risk of underusing healthcare services.

The literature on this question is very sparse. A North American study has ascertained that caregivers of senile dementia patients had a greater number of visits to their physician and a greater number of prescription medication (for their own health concerns) than their matched non-caregiver controls.¹² On the other hand, a Californian study of elderly members of a large health maintenance organisation reported no significant difference in routine physical examinations between caregivers and non-caregivers.²⁵ In both studies, however, measures of association were not adjusted for each individual's health status. Therefore, the use of healthcare services by caregivers and non-caregivers cannot be appropriately compared, since

the two groups are not comparable in terms of their health status and their resulting healthcare needs (see references above).

Considering the shortcomings in the literature, (a) we took into account the potential confounding effects of the health status and sociodemographic characteristics; (b) we considered all the adults residing with persons in poor health rather than only the effective family caregivers, so that our findings would have widespread generalisability; and (c) we investigated utilisation patterns of several types of healthcare services. Our study expands former research in this area by examining whether individuals residing with persons in poor health have a lower use of primary, specialty, and preventive care than people who have not been cast in such a situation.

METHODS

Source of Data

Cross-sectional data were collected in 2000 by the French National Institute of Statistics and Economic Studies (INSEE) through a face to face interview survey. Households were randomly drawn from the INSEE master sample (a list of households made at the time of each census that constitutes a pool from which all INSEE survey samples are drawn in the period between two censuses²⁶). Survey questionnaires were completed by 5,413 (79%) out of the 6,824 households selected. Up to 3 persons aged 15 years or older were surveyed in each household. When there were more than 3 such persons in the household, 3 were randomly selected for an interview. During scheduled interview times, 28% of the pre-selected individuals were absent. Their questionnaires were completed by another household member. Data were collected by trained interviewers using structured survey questionnaires, which captured demographic characteristics, health characteristics, socioeconomic variables (including precise financial indicators), and information on healthcare utilisation.

For the purposes of this study, individuals surveyed who were under 18 years of age (n = 464) were excluded from the study sample, so that individuals who may have little decision-making power over healthcare utilisation were not included. Individuals who had no other surveyed household member (n = 1,599) were also excluded from the analyses. Twenty-one individuals were further excluded because of incomplete information on healthcare utilisation. In the end, the study sample consisted of 8,210 individuals aged 18 years or older from 3,810 households with 2 or 3 survey respondents. Weighting coefficients were computed by INSEE to ensure that the sample was representative of the French population in terms of age, gender, and employment status.

Statistical Analysis

The 3 binary outcome variables were based on the following survey questions posed to respondents: “Over the previous 12 months: 1) Have you consulted a primary care physician? 2) Have you consulted a specialist physician (of any kind)? 3) Have you had medical tests or clinical examinations performed for preventive purposes?” For each question, respondents had to choose between the following answers: “Yes, one time; yes, two or three times; yes, more than three times; no, never”. The three binary outcomes indicated whether each individual had or had not used (a) primary care physician consultations, (b) specialist physician consultations, and (c) preventive care in the 12 months preceding the study (1 = no use; 0 = at least one utilisation).

Weighted multilevel logistic models^{27,28} with individuals nested within households were fitted for each outcome variable. Since health, demographic, and socioeconomic factors have repeatedly been shown to be associated with healthcare utilisation, they were progressively introduced into the models in order to control for potential confounders. These variables are listed and extensively detailed in *table 1*. Our purpose was to disentangle the effect of residing with persons in poor health from other interactions between household members,

such as mimicry of healthcare utilisation behaviour between such household members. Accordingly, for improved adjustment of the model for the utilisation of a given service, we considered whether individuals residing with persons who did not use that specific service in the 12 months preceding the study had an increased risk of not using it themselves (see bottom of *table 1*). Furthermore, we took into account the potential confounding effect of other-reported rather than self-reported health service utilisation for those individuals who were absent at the time of the interview: the models were adjusted for the presence/absence of individuals.

For every individual aged 18 years or older, we took into account the other persons aged 15 years or older surveyed in their household in defining the explanatory variable of interest (health status of the other persons surveyed in the household). Therefore, a given individual was considered both as an individual from the study sample and as a household member for 1 or 2 other individuals in the sample.

Separate regression models were fitted for individuals residing with 1 other survey respondent and for those residing with 2 other survey respondents. The models were used to test the following hypotheses: (a) Individuals residing with 1 other survey respondent had a higher risk of not using healthcare services in the 12 months preceding the study when the health status of the other respondent was poorer (fair or alternatively poor vs. good). (b) Individuals residing with 2 other survey respondents had a higher risk of not using healthcare services in the 12 months preceding the study when they resided with a greater number of respondents in fair or poor health (1 or alternatively 2 vs. 0).

First, we estimated models that took into account only the health status of co-residents and the number of other household respondents who did not use the healthcare service over the previous 12 months. In order to assess the potential confounding role played by the health status of individuals, we then included the different health variables (reported health status,

chronic disease, sick leave, and home assistance). In a third step, demographic and socioeconomic variables were introduced into the model.

All multilevel model parameters were estimated with MLwiN 1.2 software (Institute of Education, London, UK). Adjusted odds ratios (ORs) and 95% confidence intervals (CIs) were computed.

RESULTS

In the sample, 18% of the individuals did not use primary care services, and 45% did not use specialty care services in the 12 months preceding the study. Fifty-eight percent of the individuals used no preventive healthcare services in the 12 months preceding the study.

Twenty-seven percent of the individuals were in poor health, and 45% in fair health. Overall, 23% of individuals resided only with persons in good health. Thirty-one percent resided with at least one person in poor health. Regarding healthcare utilisation of the co-residents, 13%, 37%, and 52% of the individuals, respectively, had no co-residents who used primary, specialty, or preventive care over the previous 12 months. Many individual-level explicative variables were found to differ between those residing and those not residing with persons in fair or poor health (*table 2*). In particular, individuals residing with persons in fair or poor health had a markedly higher risk of being in fair or poor health themselves, and this association remained after adjustment for demographic and socio-economic variables (results not shown).³¹

In all our models (before and after adjustment for health, demographic and socioeconomic variables), individuals residing with survey respondents who did not use a given healthcare service had increased risks of not using that service themselves in the 12 months preceding the study (*tables 3, 4, and 5*).

In the models that were not adjusted for health and sociodemographic variables (*table 3*), residing with persons in fair or poor health was not associated with healthcare utilisation,

except in the case of specialty and preventive care for individuals residing with 2 other survey respondents. When health variables were included into the models (*table 4*), consistent associations between residing with persons in fair or poor health and utilisation of healthcare services appeared in all the models, indicating that health status was a major confounding factor (see the discussion section).

Individuals residing with 1 other survey respondent had a higher risk of not using healthcare services in the 12 months preceding the study when the health status of the other survey respondent was poorer (fair or alternatively poor vs. good) (*table 4*). The association was linear and significant for each of the 3 types of healthcare services (i.e., primary, specialty, and preventive care). Moreover, individuals residing with 2 other survey respondents had a higher risk of not using healthcare services in the 12 months preceding the study when they resided with a greater number of respondents in fair or poor health (1 or alternatively 2 vs. 0) (*table 4*). The association was linear and significant for each of the 3 types of healthcare services. As indicated in *table 5*, even if the strength of association diminished slightly in most of the cases, all these associations remained significant and dose-response when demographic and socioeconomic variables were introduced into the models.

DISCUSSION

Our study addresses an important topic that has received minimal attention in the scientific literature, namely, the utilisation of healthcare services by individuals residing with persons in poor health. Building on the earlier literature, the study provides a broader outlook by showing that residing with persons in poorer health or with a higher number of persons in fair or poor health has adverse and dose-response effects on the likelihood of using 3 different types of healthcare services (primary, specialty, and preventive care).

Limitations of the study

There are several limitations to our study. First, 21% of the households refused to participate in the survey. This is not a particularly significant rate of non-participation for such population surveys. However, we had almost no information on those households that refused to participate, and were therefore not able to assess how it could have affected the associations reported here. Second, for certain individuals in the study sample, we did not have information for all the household members (household residents under 15 years of age and certain individuals in households where there were more than 3 persons 15 or older were not surveyed). Survey data with information on all members of a household would be useful in order to obtain more accurate estimates of the risks incurred by individuals residing with persons in poor health. Third, utilisation of healthcare services was other-reported rather than self-reported for the pre-selected individuals who were absent at the time of the interview. The inclusion in models of a dummy variable for the presence/absence of the individuals indicated that those individuals who did not personally complete the survey questionnaire had a higher risk of being classified as non-users of specialty care (the effect was not significant for primary care and preventive care). Therefore, our estimates of the percentage of individuals who did not use specialty care in the 12 months preceding the study may be biased towards overestimation. However, the impact that residing with persons in fair or poor health had on specialty care utilisation remained unchanged after adjusting the model for the presence/absence of the individuals scheduled to be interviewed.

Interpretation of the findings

In our study, consistent associations between residing with persons in poor health and utilisation of healthcare services were found only when adjusting for the health status of the respondents, indicating that this variable was a major confounder. In healthcare utilisation research, it is common to adjust findings on risk factors of lower utilisation for the health

status of individuals. Indeed, residing with persons in poor health is a risk factor of lower utilisation only if those people living with sick persons have a lower utilisation of services than individuals *with similar healthcare needs* who do not reside with persons in poor health. Our findings indicate that studies investigating the association between residing with persons in poor health and healthcare utilisation, without adjusting for the respondents' own health status, may be misleading.

In France, individuals can consult any physician of their choice (primary care physician or specialist) as frequently as they wish.²⁹ Every legal resident is entitled to basic health coverage, and user charges that are not reimbursed by national Social Security (6 euros for a primary care consultation, with higher prevailing fees for specialists) are refunded by supplementary elective insurance plans. In 2000, 93% of the population carried this extra insurance.³² Therefore, even if there may not be major income-related barriers for access to healthcare in France, some people without supplementary insurance, or with supplementary insurance of a lower quality, may find it quite expensive to access certain specialised healthcare services.

In this context, several causal pathways may be suggested for associations between residing with persons in poor health and the utilisation of healthcare services. First, individuals residing with persons having considerable medical expenses may have to spend less money on their own health to allow for the increased healthcare costs of their ill household members. The financial barrier may be reinforced because individuals residing with such persons in especially poor health may consider spending money for their healthcare unwarranted in view of the more serious and urgent healthcare needs of their ill household members. Second, other mechanisms not directly related to financial resources may also play a part in certain situations, such as the time involved and the drain on affective resources. The caregiving literature reports that family caregivers experience subjective and objective

burdens^{13,18,21,22,33-37} leading to the disruption of daily life and the restriction of activity.¹⁻

^{3,12,16,38-40} Therefore, certain individuals residing with persons with a particularly deteriorated health status may be objectively and subjectively too overburdened by their caregiving activity to mind their own health.^{23,41} Finally, individuals residing with persons in poor health may downplay the importance of their own health problems in view of the problems of their ill household members and may, therefore, have a lower than expected utilisation of healthcare services.

Some of the causal pathways described above (increased healthcare costs and increased caregiving burden) may only hold true for individuals residing with persons in especially poor health. However, in our study, even those residing with persons in fair health had lower than expected utilisation of the three types of services cited earlier. Additional study may gain more insight into the causal pathways at play.

Implications for policy and practice

We identified a risk factor of lower use of several types of healthcare services that has almost never been investigated in Europe or North America. Findings similar to the ones reported here may be expected in other industrialised countries, although with minor changes due to differences in healthcare systems.

Although we found that individuals residing with persons in poor health had a lower use of medical services, we were not able to compare their levels of utilisation with existing recommendations or expressed needs. Therefore, we were not able to demonstrate whether this lower utilisation corresponds to underutilisation of care for many such individuals residing with persons in poor health. This realistic interpretation of our findings may constitute a relevant hypothesis for future research. In a public health perspective, underuse of healthcare services by individuals residing with persons in poor health would signal a need for health practitioners to broaden the scope of care beyond the patients themselves and move

toward a household centred model of care. For example, in accordance with a study that has underscored that primary care physicians are in a good position to identify caregivers at risk,²⁰ physicians might be encouraged to turn their attention to those living with their very ill patients.

In addition, if further research concludes there is a risk of underuse of healthcare services by individuals residing with ill persons, policymakers will have to consider the long term impact of this situation on the healthcare system. First, healthcare costs may be higher in an intervention-driven model of care than in a prevention-driven model of care where individuals residing with persons in poor health might benefit from the regular use of ambulatory care. Secondly, since many individuals residing with persons in poor health play an important role as family caregivers, their underuse of healthcare may not allow them to remain healthy in the long run and may lead to the increased use of the formal care system by the care-receiving household members, or even to the institutionalisation of these care-recipients. Tailoring policies to ensure that those residing with persons in poor health receive the benefit of regular use of ambulatory care (including preventive care) may be a cost-saving strategy as well.

REFERENCES

- 1 Pearlin LI, Mullan JT, Semple SJ, Skaff MM. Caregiving and the stress process: an overview of concepts and their measures. *Gerontologist* 1990;30:583-94.
- 2 Weitzner MA, Haley WE, Chen H. The family caregiver of the older cancer patient. *Hematol Oncol Clin North Am* 2000;14:269-81.
- 3 Schumacher KL, Dodd MJ, Paul SM. The stress process in family caregivers of persons receiving chemotherapy. *Res Nurs Health* 1993;16:395-404.
- 4 Navaie-Waliser M, Feldman PH, Gould DA, Levine C, Kuerbis AN, Donelan K. When the caregiver needs care: the plight of vulnerable caregivers. *Am J Public Health* 2002;92:409-13.
- 5 Emanuel EJ, Fairclough DL, Slutsman J, Alpert H, Baldwin D, Emanuel LL. Assistance from family members, friends, paid care givers, and volunteers in the care of terminally ill patients. *N Engl J Med* 1999;341:956-63.
- 6 Hodapp RM, Fidler DJ, Smith AC. Stress and coping in families of children with Smith-Magenis syndrome. *J Intellect Disabil Res* 1998;42 (Pt 5):331-40.
- 7 Dyson LL. Response to the presence of a child with disabilities: parental stress and family functioning over time. *Am J Ment Retard* 1993;98:207-18.
- 8 Beckman PJ. Influence of selected child characteristics on stress in families of handicapped infants. *Am J Ment Defic* 1983;88:150-6.
- 9 Tak YR, McCubbin M. Family stress, perceived social support and coping following the diagnosis of a child's congenital heart disease. *J Adv Nurs* 2002;39:190-8.
- 10 Hamlett KW, Pellegrini DS, Katz KS. Childhood chronic illness as a family stressor. *J Pediatr Psychol* 1992;17:33-47.

- 11 Stewart MJ, Hart G, Mann K, Jackson S, Langille L, Reidy M. Telephone support group intervention for persons with hemophilia and HIV/AIDS and family caregivers. *Int J Nurs Stud* 2001;38:209-25.
- 12 Haley WE, Levine EG, Brown SL, Berry JW, Hughes GH. Psychological, social, and health consequences of caring for a relative with senile dementia. *J Am Geriatr Soc* 1987;35:405-11.
- 13 Poulshock SW, Deimling GT. Families caring for elders in residence: issues in the measurement of burden. *J Gerontol* 1984;39:230-9.
- 14 Pinelli J. Effects of family coping and resources on family adjustment and parental stress in the acute phase of the NICU experience. *Neonatal Netw* 2000;19:27-37.
- 15 Dura JR, Haywood-Niler E, Kiecolt-Glaser JK. Spousal caregivers of persons with Alzheimer's and Parkinson's disease dementia: a preliminary comparison. *Gerontologist* 1990;30:332-6.
- 16 Weitzner MA, McMillan SC, Jacobsen PB. Family caregiver quality of life: differences between curative and palliative cancer treatment settings. *J Pain Symptom Manage* 1999;17:418-28.
- 17 Baumgarten M, Hanley JA, Infante-Rivard C, Battista RN, Becker R, Gauthier S. Health of family members caring for elderly persons with dementia. A longitudinal study. *Ann Intern Med* 1994;120:126-32.
- 18 Pruchno RA, Resch NL. Husbands and wives as caregivers: antecedents of depression and burden. *Gerontologist* 1989;29:159-65.
- 19 Schulz R, Newsom J, Mittelmark M, Burton L, Hirsch C, Jackson S. Health effects of caregiving: the caregiver health effects study: an ancillary study of the Cardiovascular Health Study. *Ann Behav Med* 1997;19:110-6.

- 20 Schulz R, Beach SR. Caregiving as a risk factor for mortality: the Caregiver Health Effects Study. *JAMA* 1999;282:2215-9.
- 21 Caserta MS, Lund DA, Wright SD, Redburn DE. Caregivers to dementia patients: the utilization of community services. *Gerontologist* 1987;27:209-14.
- 22 Angold A, Messer SC, Stangl D, Farmer EM, Costello EJ, Burns BJ. Perceived parental burden and service use for child and adolescent psychiatric disorders. *Am J Public Health* 1998;88:75-80.
- 23 Burton LC, Newsom JT, Schulz R, Hirsch CH, German PS. Preventive health behaviors among spousal caregivers. *Prev Med* 1997;26:162-9.
- 24 Covinsky KE, Goldman L, Cook EF, Oye R, Desbiens N, Reding D, et al. The impact of serious illness on patients' families. SUPPORT Investigators. Study to Understand Prognoses and Preferences for Outcomes and Risks of Treatment. *JAMA* 1994;272:1839-44.
- 25 Scharlach AE, Midanik LT, Runkle MC, Soghikian K. Health practices of adults with elder care responsibilities. *Prev Med* 1997;26:155-61.
- 26 INSEE. L'échantillon-maître fait peau neuve. *Courrier des Statistiques* 1984;29.
- 27 Diez-Roux AV. Bringing context back into epidemiology: variables and fallacies in multilevel analysis. *Am J Public Health* 1998;88:216-22.
- 28 Diez-Roux AV. Multilevel analysis in public health research. *Annu Rev Public Health* 2000;21:171-92.
- 29 Rodwin VG. The health care system under French national health insurance: lessons for health reform in the United States. *Am J Public Health* 2003;93:31-7.
- 30 INSEE. La consommation des ménages en 2001. Paris: INSEE, 2002.
- 31 Hippisley-Cox J, Coupland C, Pringle M, Crown N, Hammersley V. Married couples' risk of same disease: cross sectional study. *Bmj* 2002;325:636.

- 32 Busse R, Dixon A, Healy J, Krasnik A, Leon S, Paris V, et al. Health care systems in eight countries: trends and challenges. London: London School of Economics & Political Science, 2002.
- 33 Zarit SH, Todd PA, Zarit JM. Subjective burden of husbands and wives as caregivers: a longitudinal study. *Gerontologist* 1986;26:260-6.
- 34 Hinrichsen GA, Ramirez M. Black and white dementia caregivers: a comparison of their adaptation, adjustment, and service utilization. *Gerontologist* 1992;32:375-81.
- 35 Wackerbarth SB, Johnson MM. Essential information and support needs of family caregivers. *Patient Educ Couns* 2002;47:95-100.
- 36 Cousineau N, McDowell I, Hotz S, Hebert P. Measuring chronic patients' feelings of being a burden to their caregivers: development and preliminary validation of a scale. *Med Care* 2003;41:110-8.
- 37 Yaffe K, Fox P, Newcomer R, Sands L, Lindquist K, Dane K, et al. Patient and caregiver characteristics and nursing home placement in patients with dementia. *JAMA* 2002;287:2090-7.
- 38 Navaie-Waliser M, Spriggs A, Feldman PH. Informal caregiving: differential experiences by gender. *Med Care* 2002;40:1249-59.
- 39 Boaz RF. Full-time employment and informal caregiving in the 1980s. *Med Care* 1996;34:524-36.
- 40 Mant J, Carter J, Wade DT, Winner S. Family support for stroke: a randomised controlled trial. *Lancet* 2000;356:808-13.
- 41 O'Brien MT. Multiple sclerosis: health-promoting behaviors of spousal caregivers. *J Neurosci Nurs* 1993;25:105-12.

Table 1 Variables used as adjustment factors in regression models

Variables	Categories of the variable
Age	Under 30 ^a ; 30-44; 45-59; 60 or over
Gender	Male ^a ; female
Marital status	Married ^a ; never married; divorced; widowed
Health status	Good ^a ; fair; poor
Chronic disease ^b	No ^a ; yes
Sick leave in the previous 12 months	None ^a ; one week or less; one week to 1 month; more than 1 month
Received home assistance in the previous 12 months ^c	No ^a ; yes
Educational achievement	Primary school or less ^a ; secondary school; university; still a student
Employment status	Working ^a ; unemployed; student; retired; housewife; other
Health insurance status ^d	Supplementary insurance ^a ; only basic insurance; fully insured for medical reasons
Number of other respondents with only basic insurance	<i>For individuals residing with 1 other respondent: 0^a; 1. For individuals residing with 2 other respondents: 0^a; 1; 2</i>
Unemployment allowance recipient	No ^a ; yes
Family allowance recipient	No ^a ; yes
Unearned income recipient (dividend, rent, interest)	No ^a ; yes
Household income per capita ^e	First quartile ^a ; second quartile; third quartile; fourth quartile
Housing tenure	Owner occupier ^a ; tenant; non-rent paying occupant
Score for ownership of several goods ^f	Low score (4 goods or less out of 12) ^a ; mid-low score (5 or 6 goods); mid-high score (7 or 8 goods); high score (9 goods or more)
Financial problems for heating the home	No ^a ; yes
Family status	Couple with children ^a ; couple without children; single parent family
More than 3 persons aged 15 years or older in the household ^g	No ^a ; yes
Absence of the individual at the time of the interview	No ^a ; yes
Number of other respondents who did not use the healthcare service under study	<i>For individuals residing with 1 other respondent: 0^a; 1. For individuals residing with 2 other respondents: 0^a; 1; 2</i>

a: This is the reference category.

b: This variable is based on the yes/no question: “Are you being treated for a chronic disease?”

c: This variable is based on the yes/no question: “Over the previous 12 months, have you received some help because of your health from a person not belonging to the household?”

d: In France, people have health coverage on the basis of legal residence. User charges not reimbursed in this way may be refunded by supplementary elective health insurance.²⁹ People with a serious chronic illness are completely exempt from paying healthcare charges in France.

e: Household income was divided by the number of units in the household (estimated with a method by the Organisation for Economic Co-operation and Development – see: OECD Health Data 2002. Paris: OECDDevelopment, 2002).

f: Twelve goods were selected by INSEE, based on previous studies of the consumption of French households³⁰: refrigerator, freezer, refrigerator-freezer, washing machine, microwave oven, television set, hi-fi system, Minitel (electronic directory), cell phone, car, laptop, desktop computer.

g: The variable was only introduced in the model for individuals residing with 2 other respondents.

Table 2 Main characteristics of individuals residing / not residing with persons in fair or poor health, and p-values of statistical tests^a

	Individuals not residing with persons in fair or poor health	Individuals residing with persons in fair or poor health	p-value ^a
Age (mean)	39 years	46 years	< 0.0001
Females (%)	57%	49%	< 0.0001
Marital status			< 0.0001
Married (%)	66%	70%	
Never married (%)	26%	24%	
Divorced (%)	6%	3%	
Widowed (%)	2%	3%	
Health status			< 0.0001
Good (%)	62%	16%	
Fair (%)	27%	52%	
Poor (%)	11%	32%	
Educational achievement			< 0.0001
Primary school or less (%)	10%	28%	
Secondary school (%)	53%	51%	
University (%)	29%	16%	
Health insurance status			< 0.0001
Only basic insurance (%)	6%	7%	
Supplementary insurance (%)	90%	85%	
Fully insured for medical reasons (%)	4%	8%	
Annual household income per capita in € (mean)	16,366	14,264	< 0.0001

a: We used the two-sided Wilcoxon test for the continuous variables (age, income), and the chi-square test for the categorical variables.

Table 3 Non-adjusted effect of (a) residing with persons in fair or poor health, and (b) residing with non-users of healthcare services, on the risk of not using primary, specialty, and preventive care in the 12 months preceding the study. Non-adjusted odds ratio (OR) and 95% confidence interval (CI)

	No primary care in the previous 12 months		No specialty care in the previous 12 months		No preventive care in the previous 12 months	
	OR ^a	95% CI	OR ^a	95% CI	OR ^a	95% CI
For individuals residing with 1 other respondent (n = 5,423)						
Health status of the other respondent						
Good	1.00		1.00		1.00	
Fair	0.99	(0.82, 1.18)	1.16	(1.01, 1.32)	1.08	(0.95, 1.24)
Poor	0.82	(0.66, 1.02)	1.14	(0.98, 1.33)	1.13	(0.97, 1.31)
Number of other respondents who did not use the service ^b						
Zero	1.00		1.00		1.00	
One	3.91**	(3.29, 4.65)	1.31**	(1.17, 1.46)	2.71**	(2.43, 3.03)
For individuals residing with 2 other respondents (n = 2,787)						
Number of other respondents in poor or fair health						
Zero	1.00		1.00		1.00	
One	1.01	(0.77, 1.31)	1.49**	(1.19, 1.86)	1.17	(0.92, 1.48)
Two	0.91	(0.70, 1.17)	1.44**	(1.17, 1.78)	1.35*	(1.08, 1.69)
Number of other respondents who did not use the service ^b						

Zero	1.00	1.00	1.00
One	3.52** (2.87, 4.31)	1.88** (1.56, 2.28)	1.99** (1.58, 2.51)
Two	4.85** (3.60, 6.53)	3.01** (2.45, 3.70)	4.42** (3.51, 5.58)

a: The effects of residing with persons in fair or poor health and of residing with non-users of healthcare services were adjusted for each other, but were not adjusted for other covariates.

b: When investigating predictors of utilisation of a given service, we adjusted for whether the other household residents had used the same service (with no consideration for the other two types of services investigated).

* $p < 0.01$; ** $p < 0.001$

Table 4 Effect of (a) residing with persons in fair or poor health, and (b) residing with non-users of healthcare services adjusted for health variables, on the risk of not using primary, specialty, and preventive care in the 12 months preceding the study. Odds ratio (OR) and 95% confidence interval (CI) adjusted for health variables only

	No primary care in the previous 12 months		No specialty care in the previous 12 months		No preventive care in the previous 12 months	
	OR ^a	95% CI	OR ^a	95% CI	OR ^a	95% CI
For individuals residing with 1 other respondent (n = 5,423)						
Health status of the other respondent						
Good	1.00		1.00		1.00	
Fair	1.63**	(1.32, 2.03)	1.68**	(1.43, 1.97)	1.45**	(1.24, 1.69)
Poor	2.00**	(1.54, 2.59)	2.43**	(2.01, 2.94)	1.89**	(1.57, 2.26)
Number of other respondents who did not use the service ^b						
Zero	1.00		1.00		1.00	
One	4.23**	(3.50, 5.11)	1.46**	(1.29, 1.65)	2.91**	(2.59, 3.26)
For individuals residing with 2 other respondents (n = 2,787)						
Number of other respondents in poor or fair health						
Zero	1.00		1.00		1.00	
One	1.28	(0.95, 1.73)	1.73**	(1.35, 2.21)	1.31	(1.02, 1.69)
Two	1.67*	(1.23, 2.28)	2.15**	(1.69, 2.75)	1.93**	(1.50, 2.48)
Number of other respondents who did not use the service ^b						
Zero	1.00		1.00		1.00	

One	3.86** (3.09, 4.83)	1.97** (1.61, 2.41)	2.15** (1.69, 2.74)
Two	6.99** (4.95, 9.88)	3.69** (2.95, 4.60)	5.11** (4.00, 6.53)

a: The effects of residing with persons in fair or poor health and of residing with non-users of healthcare services were adjusted for each other, and were further adjusted for all health variables listed in table 1: health status, chronic disease, sick leave, and home assistance.

b: When investigating predictors of utilisation of a given service, we adjusted for whether the other household residents had used the same service (with no consideration for the other two types of services investigated).

* $p < 0.01$; ** $p < 0.001$

Table 5 Fully adjusted effect of (a) residing with persons in fair or poor health, and (b) residing with non-users of healthcare services, on the risk of not using primary, specialty, and preventive care in the 12 months preceding the study. Fully adjusted odds ratio (OR) and 95% confidence interval (CI)

	No primary care in the previous 12 months		No specialty care in the previous 12 months		No preventive care in the previous 12 months	
	OR ^a	95% CI	OR ^a	95% CI	OR ^a	95% CI
For individuals residing with 1 other respondent (n = 5,423)						
Health status of the other respondent						
Good	1.00		1.00		1.00	
Fair	1.56** (1.21, 2.01)		1.39** (1.16, 1.67)		1.34* (1.11, 1.61)	
Poor	1.89** (1.39, 2.56)		1.69** (1.36, 2.10)		1.67** (1.34, 2.07)	
Number of other respondents who did not use the service ^b						
Zero	1.00		1.00		1.00	
One	3.88** (2.92, 5.17)		1.38* (1.13, 1.67)		2.92** (2.45, 3.50)	
For individuals residing with 2 other respondents (n = 2,787)						
Number of other respondents in poor or fair health						
Zero	1.00		1.00		1.00	
One	1.24 (0.83, 1.86)		1.65* (1.13, 2.41)		1.28 (0.97, 1.68)	
Two	1.69* (1.15, 2.48)		1.77* (1.21, 2.58)		1.70** (1.27, 2.26)	
Number of other respondents who did not use the service ^b						
Zero	1.00		1.00		1.00	

One	3.35** (2.34, 4.79)	1.72* (1.22, 2.41)	2.20** (1.47, 3.29)
Two	5.52** (3.27, 9.34)	2.60** (1.86, 3.63)	5.33** (3.73, 7.61)

a: The effects of residing with persons in fair or poor health and of residing with non-users of healthcare services were adjusted for each other, and were further adjusted for all the factors listed in table 1.

b: When investigating predictors of utilisation of a given service, we adjusted for whether the other household residents had used the same service (with no consideration for the other two types of services investigated).

* $p < 0.01$; ** $p < 0.001$
