

Changes in access to primary care in Europe and its patterning, 2007–12: a repeated cross-sectional study

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Background: The strengthening of primary care (PC) has been encouraged as a strategy to achieve more efficient and equitable health systems. However, the Great Recession may have reduced access to PC. This paper analyses the change in access to PC and its patterning in 28 European countries between 2007 and 2012. **Methods:** We used data from the 2007 and 2012 waves of the EU-SILC questionnaire ($n = 687\,170$). The dependent variable was the self-reported access to PC ('easy' vs. 'difficult'). We modelled the access to PC as a function of the year and individual socioeconomic and country-level health system variables, using a mixed effects logistic regression, adjusting for sex, age, civil status, country of birth, chronic condition and self-reported health. Additionally, we interacted the year with socioeconomic and country-level variables. **Results:** The probability of reporting difficult access to PC services was 4% lower in 2012, in comparison with 2007 (OR = 0.96, $P < 0.01$). People with the lowest educational level (OR = 1.63, $P < 0.01$), high difficulty to make ends meet (OR = 1.94, $P < 0.01$) and with material deprivation (OR = 1.25, $P < 0.01$) experienced a significantly higher likelihood of difficult access. The better access in 2012 was significantly higher in people living in countries with higher health expenditures, a greater number of generalist medical practitioners, and with stronger gatekeeping. **Conclusion:** Access to PC improved between 2007 and 2012, and this improvement was greater for people living in countries with a higher investment in health and PC. However, the poor access amongst low-SE status people was stable over the period.

Introduction

An adequate access to primary care (PC) is essential to ensure disease prevention, early diagnosis and adequate referral to secondary care.¹ The strengthening of PC has therefore been encouraged internationally as a strategy to achieve more efficient health systems through infrastructure, qualified PC professionals and supportive PC policies.²

Access to PC can be influenced by health systems and individual features. On the system side, the main determinants are (i) availability, such as the sufficient supply of general practitioners (GPs) and equipment; (ii) geographical accessibility; (iii) organizational features, such as the existence of an appointment system, after-hours care arrangements and home visits; and (iv) affordability. On the individual side, we may mention (i) health needs and patient behaviour, i.e. the propensity to visit (or not) a GP according to self-perceived needs; and (ii) socioeconomic (SE) status, i.e. low-educated people may lack awareness and knowledge of the health system and may delay search for needed healthcare due to financial constraints on transportation costs or co-payments.³

During an economic recession, access to PC may be affected through disinvestment in healthcare, which may influence the availability, affordability and other organizational features of PC, and due to variations in people's SE status and health needs. During the Great Recession, which has affected most of the European countries since 2008, some countries were better prepared than others as a result of some pre-existing fiscal measures (e.g. Czech Republic, Italy, Lithuania and Slovakia), but other countries, such as Greece, Spain and Portugal, had to adopt strict fiscal austerity, with large budget cuts and public sector reforms that may have restricted access to healthcare.⁴ Studies performed in Portugal,⁵ Greece⁶ and in the Baltic states⁷ reported a significant increase in 'unmet medical need' during this period. The odds of reporting having an unmet medical need more than doubled in Portugal, the odds of facing unmet medical need were higher for

unemployed and uninsured patients in Greece, and the main reason for this increase in Latvia and Estonia was the inability to afford care and long waiting lists, respectively.

Nevertheless, to the best of our knowledge, no study has assessed the self-reported access to PC during this period, even though it is the main avenue to healthcare for most European citizens. Using a large database from 28 European countries, we analysed the change in self-reported access to PC before and during the Great Recession; we examined if some countries' health system characteristics influenced access to PC during this period; and we examined if low-SE status people have been more affected than others during this period.

Methods

Data sources

We used individual and household data from the 2007 and 2012 cross-sectional waves of the European Statistics on Income and Living Conditions (EU-SILC) of 28 European countries. EU-SILC is a harmonized representative population survey on income distribution and social inclusion in Europe. The non-response rates varied from 8% (Cyprus) to 42% (Denmark) and from 5% (Romania) to 58% (Denmark) in 2007 and 2012, respectively.⁸ Our final sample comprised 687 170 individuals aged 25–81 years old. We excluded individuals younger than 25 years old ($n = 119\,408$) because we used education as an important covariate of the SE status, and people younger than 25 are less likely to have concluded their education. Country level data were obtained from OECD,^{9–11} WHO,¹² Eurostat¹³ and World Bank sources.¹⁴

Dependent variable

We used the question on access to PC services to evaluate the self-perceived access to PC. Here, 'PC services' refers to 'a GP, a primary

Table 1 Individual/household's and country level characteristics in 2007 and 2012 of primary care users

	2007		2012	
	(n = 339 453)		(n = 347 717)	
Individual characteristics	<i>n</i>	%	<i>n</i>	%
Difficult access to PC	73 903	22	72 280	21
Age [mean (SD)]	52	(16)	53	(16)
Male	157 713	46	160 326	46
Married	218 141	64	214 014	62
Country of birth (same as residence)	313 449	92	317 591	92
Country of birth (any other EU country)	8 762	3	11 637	3
Country of birth (any other country)	17 242	5	18 489	5
Education ^a				
Tertiary education	85 858	25	97 212	28
Secondary education	193 440	57	198 276	57
No education/primary education	60 155	17	52 229	15
Deprivation	68 314	20	76 583	22
Ability to make ends meet				
Easily or very easily	64 269	19	59 076	17
Fairly easily	84 974	25	78 082	22
With some difficulty	103 438	30	103 461	30
With difficulty or great difficulty	86 772	26	107 098	31
Self-reported health				
Very good	59 711	18	61 129	18
Good	141 483	42	151 323	44
Fair	91 954	27	90 559	26
Bad or very bad	46 305	14	44 706	13
Chronic condition	113 635	33	122 999	35
Country level characteristics				
Gatekeeping ^b				
No gatekeeping	83 189	25	81 885	24
Moderate gatekeeping	106 903	31	111 037	32
Fully enforced gatekeeping	149 361	44	154 795	44
Total health expenditure per capita [mean (SD)]	2650	(1210)	2840	(1310)
Rate of GMP per 1000 inhabitants [mean (SD)]	0.94	(0.54)	0.95	(0.50)

Note: Sample: individuals aged 25 and over.

Source: EU-SILC 2007 and 2012.

a: The levels of education were constructed based on the aggregation of ISCED (International Standard Classification of Education) levels: 0–1, 2–3 and 4–5 for 'no education/primary education', 'secondary education' and 'tertiary education', respectively.

b: No gatekeeping: AT (Austria) CY (Cyprus) CZ (Czech Republic) DE (Germany) GR (Greece) IS (Iceland) LU (Luxembourg) SE (Sweden); Moderate gatekeeping: BE (Belgium) BG (Bulgaria) EE (Estonia) FI (Finland) FR (France) IE (Ireland) LV (Latvia) PL (Poland) SK (Slovak Republic); Fully enforced gatekeeping: DK (Denmark) ES (Spain) HU (Hungary) IT (Italy) LT (Lithuania) NL (Netherlands) NO (Norway) PT (Portugal) RO (Romania) SI (Slovenia) UK (United Kingdom).

health centre, or to a casualty department or similar, where first-aid treatment could be received', and access is defined in terms of the financial, physical, technical and health conditions of the household (e.g. distance, opening hours, infrastructure and equipment for people with physical disability), but not in terms of quality.¹⁵ Note that the access is evaluated for the household as a whole, which means, for example, that 'if one member of the household has a disability, but if another member can access easily to the service for him, without representing any burden for the household, then the service would be considered as easily accessible by the entire household'. (p. 3)¹⁵ Therefore, all individuals within the household are classified as having the same difficulty to access to PC.

First, the question 'From the place where you live, does the household use the services of primary health care facilities?' is rated as 'used' and 'not used', and only if answered 'used', is there the subsequent question, 'How do you rate this access?', which is assessed on a Likert scale: (i) 'with great difficulty', (ii) 'with some difficulty', (iii) 'easily' or (iv) 'very easily'.¹⁵ We created a binary variable for 'difficult access to PC' by combining the first and second options, and the third and fourth, since only 4.11% of our sample experienced 'great difficulty' of accessing PC. We excluded observations with missing data on the use of PC ($n = 1999$; 0.3% of the sample), and individuals who did not rate the difficulty in access because they did not use PC services ($n = 11 502$; 1.6% of the sample).

Explanatory variables

A recession is said to occur when real GDP falls for two consecutive calendar quarters.¹⁶ We measured the change across time using a year binary variable, with the 2007 wave representing access to PC before the Great Recession, when none of the 28 countries had a negative percentage change in GDP based on the previous year; and the 2012 wave representing the access to PC during/post-Great Recession, when 13 of the 28 countries still had a negative percentage change in GDP in the previous year, and others were in a recent post-recession period.¹⁷

We used individual SE characteristics to measure differences in access between the low-SE vs. high-SE status people. We used the education level, the ability to make ends meet and material deprivation. Note that the last two variables are collected at the household level; therefore, all individuals within the household have the same values. We divided the education categories into three levels, and the ability to make ends meet into four categories. We created a dummy variable of material deprivation based on the Eurostat definition as the enforced inability (rather than the choice not to do so) to afford at least three of nine specific items considered by most people to be desirable or even necessary to lead an adequate life.¹⁸

We also used as explanatory variables specific health system characteristics that may influence the propensity to visit a GP, such as: the supply of PC services measured by the rate of generalist medical

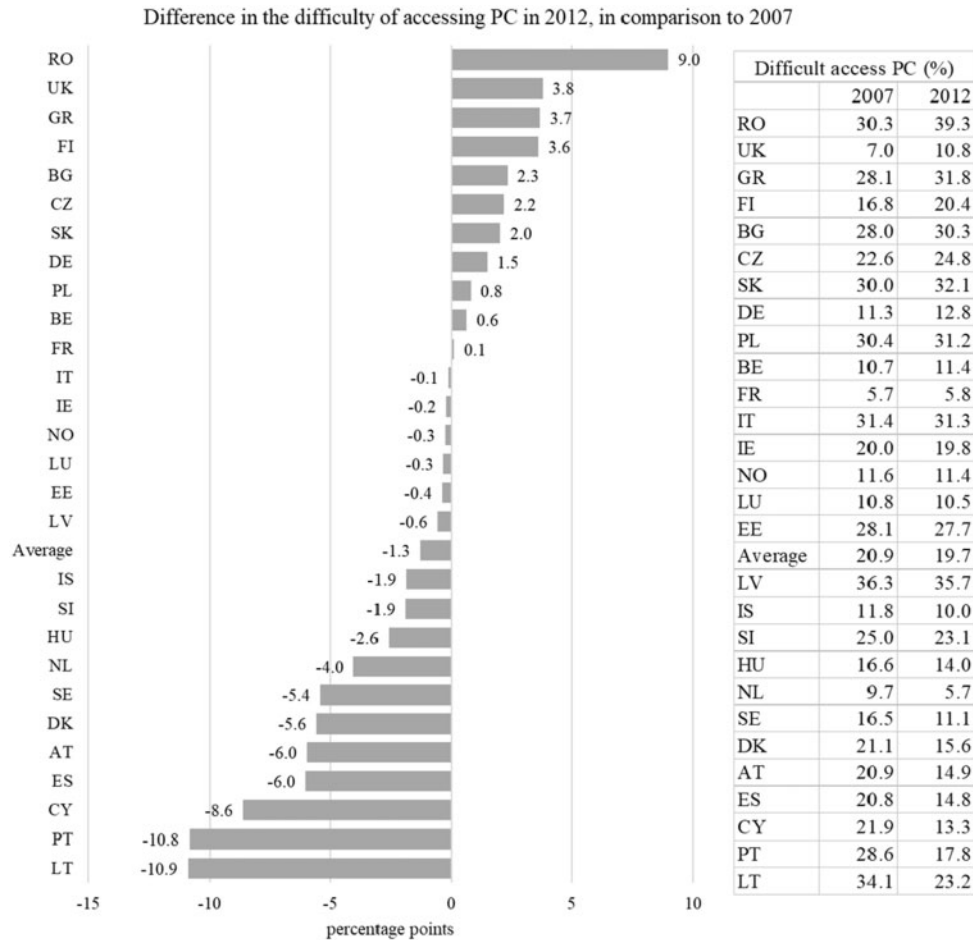


Figure 1 Difference in reporting difficult access to primary care between 2007 and 2012, by country. Note: Switzerland, Croatia and Malta are not included due to missing data in 2007. Source: EU-SILC 2007 and 2012; authors' computations

practitioners (GMP) per 1000 inhabitants,¹³ the total health expenditure per capita (US Dollar, 2010 constant prices, constant PPPs, OECD base year),^{9,14} and the existence of a gatekeeping system to specialist services (2, 'fully enforced gatekeeping system'; 1, 'moderate gatekeeping'; and 0, 'no gatekeeping').^{10–12}

Covariates

We controlled for individual variables, namely age, sex, civil status, country of birth, self-reported health and the existence of a chronic condition, as proxies for needs.¹⁹ Observations with missing data on any of the explanatory variables or covariates were excluded ($n = 25\,007$; 3.5% of the sample).

Statistical analysis

We modelled the self-reported access to PC as a function of the year, and individual SE and country-level variables, using multilevel mixed-effects logistic regression, with two level predictors. The use of a multilevel mixed-effects model (i.e. containing both fixed effects and random effects) is justified by individuals being nested in different countries.²⁰ In our data, level 1 corresponds to the fixed equation of the model at the individual-level in which the odds ratios are analogous to those in a standard regression and are estimated directly. Level 2 corresponds to the random equation of the model at the country-level, which is intended for modelling the intra-country correlation, since the observations in the same country are correlated because they share common cluster-level random effects. These random effects take the form of random intercepts

or random coefficients, and are summarized according to their estimated variances and covariances.²⁰ This was the base model (Regression I). Additionally, we performed two separate regressions with interactions. Regression II contains interaction terms between year and level 1 variables (SE variables of the individual), with the assumption that the Great Recession might have affected access to PC differently in low-SE and high-SE status people. Regression III contains interaction terms between year and level 2 variables, with the assumption that the Great Recession might have influenced access to PC differently in countries with different rates of GMP per 1000 inhabitants, with different total health expenditures per capita, and with different gatekeeping systems.

The likelihood-ratio test comparing the model to ordinary logistic regression without the conditional set of random effects was highly significant ($P < 0.00$) for all our models, precluding the use of a simple logistic regression model.²⁰ Furthermore, a similar methodology has been used by other researchers, using 2009 EU-SILC data, to study unmet needs.²¹ All the analyses were conducted with Stata version 13.

Results

Descriptive analysis

Descriptive statistics are presented in table 1. In 2007 and 2012, 22% and 21% of individuals reported having difficult access to PC services, respectively. People with no education/primary education fell from 17% to 15% between 2007 and 2012, and the percentage of

Table 2 Multilevel mixed-effects logistic regression for the probability of reporting difficult access to primary care, between 2007 and 2012, in 28 European Countries

	Regression I	
	OR (odds ratio)	[95% CI]
Difficult access to PC		
Year 2007	1	
Year 2012	0.96***	(0.95; 0.98)
Individual characteristics		
Age	1.00***	(1.00; 1.00)
Female	1	
Male	1.02***	(1.01; 1.03)
Not married	1	
Married	1.00	(0.98; 1.01)
Country of birth (same as residence)	1	
Country of birth (any other EU country)	0.95**	(0.91; 0.99)
Country of birth (any other country)	0.73***	(0.71; 0.75)
Education (tertiary education)	1	
Secondary education	1.21***	(1.19; 1.23)
No education/primary education	1.63***	(1.59; 1.66)
No deprivation	1	
Deprivation	1.25***	(1.23; 1.27)
Make ends meet (easily or very easily)	1	
Fairly easily	1.32***	(1.29; 1.35)
With some difficulty	1.72***	(1.68; 1.76)
With difficulty or great difficulty	1.94***	(1.89; 1.99)
Self-reported health (very good)	1	
Good	1.13***	(1.11; 1.15)
Fair	1.29***	(1.26; 1.33)
Bad or very bad	1.71***	(1.66; 1.76)
No chronic condition	1	
Chronic condition	1.03***	(1.02; 1.05)
Country level characteristics		
No gatekeeping	1	
Moderate gatekeeping	1.28	(0.83; 1.98)
Fully enforced gatekeeping	1.06	(0.70; 1.61)
Health expenditure	0.96*	(0.93; 1.00)
Rate of GMP	0.66***	(0.61; 0.72)
Intercept (general)	0.14	(0.10; 0.20)
Intercept (country)	0.20	(0.12; 0.35)

Note: The intra-class correlation (ICC) for the empty model was 0.10 (95% CI 0.06; 0.16) and 0.06 (95% CI 0.04; 0.10) after the addition of all individual variables.

*: $P < 0.1$; **: $P < 0.05$; ***: $P < 0.01$.

people with difficulties/great difficulties to make ends meet rose from 26% to 31%. The mean total health expenditure per capita and the rate of GMP per 1000 inhabitants was 2650\$ and 0.94, and 2840\$ and 0.95 in 2007 and 2012, respectively, and 44% of the individuals lived in a country with fully enforced gatekeeping systems.

Between 2007 and 2012, 17 countries experienced a decrease in the difficulty of accessing PC, with the highest decrease observed in Lithuania (-10.9 pp) and the lowest decrease observed in Italy (-0.1 pp). Eleven countries experienced an increase in the difficulty of accessing PC, with the lowest increase reported in France (0.1 pp) and the highest increase reported in Romania (9.0 pp; [figure 1](#)).

Multivariate analysis

The probability of reporting difficult access to PC services was 4% lower in 2012 in comparison with 2007 (OR = 0.96, $P < 0.01$; Regression I, [table 2](#)). People with the lowest educational level (OR = 1.63, $P < 0.01$), with the highest difficulty to make ends meet (OR = 1.94, $P < 0.01$), and with material deprivation (OR = 1.25, $P < 0.01$) experienced a significantly higher likelihood of difficult access to PC services. Also, people with the poorest self-reported health and people with a chronic condition experienced a significantly higher difficulty in accessing PC (OR = 1.71, $P < 0.01$ and OR = 1.03, $P < 0.01$, respectively).

People living in countries with higher total health expenditures per capita and with a higher rate of GMP per 1000 inhabitants experienced a lower difficulty of accessing PC. Specifically, a 1000 US\$ higher health expenditure per capita was associated with a 4% improvement in access to PC (OR = 0.96, $P < 0.1$), and a one-point higher rate of GMP per 1000 inhabitants was associated with a 34% significantly lower probability of difficult access to PC (OR = 0.66, $P < 0.01$).

The effect of individual SE characteristics during the great recession

The statistical significance of the interactions was tested using the contrasts of marginal linear predictions test.²² The results were statistically significant only for education ($P < 0.01$). Between 2007 and 2012 there was a slight but significant improvement in access to PC, for those with secondary education in comparison with those with tertiary education (OR = 0.99, $P < 0.01$), but overall there were no significant changes in the SE patterning of access to PC (Regression II, [table 3](#)).

The effect of the health systems characteristics during the great recession

The results for the interacting terms were statistically significant ($P < 0.01$) for all health systems characteristics, which indicates that between 2007 and 2012 access to PC was significantly improved for people living in countries with higher total health expenditures per capita; with higher rate of GMP per 1,000 inhabitants, and with fully enforced gatekeeping systems (OR = 0.94, $P < 0.01$; Regression III, [table 3](#)).

Conclusions

Key findings and interpretation

First, our study shows that the probability of reporting difficult access to PC in 28 European countries fell by 4% in 2012, in comparison to 2007. Some studies showed that unmet medical needs increased significantly across Europe during the Great Recession.^{5–7,23–25} However, these studies did not investigate where these needs were unmet. Our finding clearly suggests that these worrisome results may not have been caused by access to PC. In fact, during the Great Recession, in many countries there was an impulse towards outpatient care through the substitution of secondary care with PC, an increased centralization of hospitals with improved coordination in PC, and an overall investment in PC.^{26,27}

For example, in Portugal despite the increase in user charges (co-payments) at all levels of care, it was ensured that this rise was proportionally lower for PC, and that the fees remained relatively low. Also, other incentives were set for patients to go first to PC, such as the exemption of user charges in emergency care from episodes that resulted from referral by a GP.²⁸ In Latvia, co-payments for GP were kept relatively unchanged, despite the increase for outpatient care. Additionally, the share of spending on GP care increased from 9% in 2008–14% in 2010, and the payments to GP also rose by 45% during this period.²⁷ Also in Lithuania PC suffered less drastic budget cuts as compared with other levels of care, and had funding priority. In addition, providers were forced to increase efficiency by introducing incentives to treat more patients in PC (amongst other measures), in order to maintain access to healthcare.²⁷ In the Netherlands GPs were given a more central role in the provision of care in the community, and their role as gatekeepers was strengthened. Also, specialized nurses to provide care for patients with chronic diseases were introduced at the PC level. In order to achieve this, the expenditure on GP care was allowed to grow by 2.5% per year between 2014 and 2017, while

Table 3 Multilevel mixed-effects logistic regression for the probability of reporting difficult access to primary care, including individual and country level interactions with year

	Regression II		Regression III	
	OR (odds ratio)	[95% CI]	OR (odds ratio)	[95% CI]
Difficult access to PC				
Year 2007	1		1	
Year 2012	0.94***	(0.90; 0.98)	1.22***	(1.16; 1.28)
Individual characteristics				
Education (tertiary education)	1		1	
Secondary education	1.18***	(1.16; 1.21)	1.21***	(1.19; 1.23)
No education/primary education	1.63***	(1.58; 1.68)	1.63***	(1.59; 1.66)
No Deprivation	1		1	
Deprivation	1.24***	(1.21; 1.27)	1.26***	(1.24; 1.28)
Make ends meet (Easily or very easily)	1		1	
Fairly easily	1.31***	(1.27; 1.35)	1.32***	(1.29; 1.35)
With some difficulty	1.69***	(1.64; 1.75)	1.72***	(1.68; 1.76)
With difficulty or great difficulty	1.97***	(1.91; 2.04)	1.94***	(1.86; 1.99)
Individual level interactions				
Education # year 2012				
Education (tertiary education)	1			
Secondary education	1.05***	(1.02; 1.09)		
No education/primary education	1.00	(0.96; 1.04)		
Deprivation # year 2012	N/S			
Make ends meet # year 2012	N/S			
Country level characteristics				
No gatekeeping	1		1	
Moderate gatekeeping	1.26	(0.82; 1.94)	1.36	(0.87; 2.12)
Fully enforced gatekeeping	1.05	(0.70; 1.58)	1.19	(0.78; 1.81)
Health expenditure	0.95**	(0.91; 0.99)	1.03	(0.98; 1.07)
Rate of GMP	0.66***	(0.61; 0.72)	0.73***	(0.66; 0.79)
Country level interactions				
Gatekeeping # 2012				
No gatekeeping			1	
Moderate gatekeeping			0.98	(0.94; 1.03)
Fully enforced gatekeeping			0.86***	(0.83; 0.89)
Health expenditures # 2012				
Health expenditure			0.96***	(0.95; 0.98)
Rate of GMP # 2012				
Rate of GMP			0.93***	(0.90; 0.96)
Intercept (general)	0.15	(0.10; 0.21)	0.10	(0.07; 0.14)
Intercept (country)	0.20	(0.12; 0.34)	0.21	(0.13; 0.36)

Note: #, interaction; N/S, not significant. Both regressions included as confounder the age, sex, civil status, country of birth, self-reported health and chronic condition. The odds ratios for these variables were not included in the table to ease the reading.

** : $P < 0.05$; *** : $P < 0.01$.

other healthcare expenditures were forced to decrease.²⁷ In Belgium one of the programme aimed at strengthening PC was to grant financial incentives to GPs to establish their practices in deprived areas.²⁷ There are thus many examples suggesting that in some countries the budget cuts in the healthcare sector did not affect the most basic and inexpensive care, and were even accompanied by improved access to PC.

Second, our study also shows that people with low SE status, i.e. with lower education, lower ability to make ends meet, and those with material deprivation, reported poorer access to PC, suggesting significant SE inequalities in favour of the high-SE status people, after controlling for need differences. Earlier studies report no evidence of income-related inequality in the utilization of PC services, measured by the probability of visiting a GP, and by the conditional number of visits, in EU²⁹ and OECD³⁰ countries. Some authors even report a pro-poor distribution in some countries.^{29,30} We assume that accessing PC represents a considerable burden for people with low-SE status, and that they may live in SE disadvantaged areas where access to PC may be influenced by the availability (or not) of transportation systems, by the distance to PC facilities, and by a shortage of PC physicians.³¹ We used a subjective measure of the economic hardship (make ends meet) instead of income, since this perceived economic well-being is an important indicator for understanding the financial capacity of the individual

at any age.³² This measure is used in many studies, and has shown clear associations with health outcomes.³³ Nevertheless, we also performed the analysis using quintiles of income, and the SE patterning was maintained, with the people in the lowest quintiles of income experiencing a significantly greater likelihood of difficult access to PC services, in comparison with the highest quintile of income (OR = 1.63, $P < 0.01$).

Third, our study shows that in 2012, in comparison to 2007, there were no substantial changes in the SE patterning of access to PC, which suggests that the SE inequalities in access to PC remained the same, which is consistent with the persistent SE inequalities in health in Europe.³⁴ Nonetheless, it also indicates that during the period of the economic crisis the most vulnerable populations were not impaired in relation to the better-off, and that some policy measures were in place to provide some social and financial protection to the poorer people. For example, in Portugal, exemptions to user charges increased considerably, with the purpose of protecting the lower-income people and other vulnerable population groups.²⁸ Also, in the Netherlands the decrease of care allowance was adjusted in a way that people with lower incomes experienced less reduction than people with higher incomes and additional protection was offered for GP care, maternity care and care for children.²⁶

Finally, our results show that during the Great Recession people living in countries with higher total health expenditures per capita, with higher rate of GMP per 1000 inhabitants, and with fully enforced gatekeeping systems experienced a greater improvement in access to PC. Recent evidence showed that European countries with higher overall health expenditures had stronger PC systems, possibly due to the decentralization of services delivery and due to the necessary costs of maintaining this strong structure, but had also slower growth in healthcare spending.³⁵ This result suggests that countries with higher investment in health and PC resources were better equipped to face the detrimental effect of the crisis in access to PC.

Limitations

This study has some limitations that should be addressed. First, it would be desirable to measure the yearly evolution of the difficulty of access to PC before and during the entire period of the Great Recession. However, data regarding the access to PC are available only in the *ad hoc* modules of the EU-SILC, which are collected every five years. Therefore, we were able to analyse the changes in access to PC only between 2007 and 2012, which however correspond well to the pre- and post-recession period.

Second, we did not measure access in terms of effectiveness, quality and continuity of care, since these are not taken into consideration in the questionnaire. Therefore, some people may have good physical access to PC but they may have poor treatment compliance, lower quality of care or lower continuity of care.

Third, access is a broad concept and the perception of the difficulty in access to PC may vary both within and across countries. Even though there is a comprehensive validation procedure applied for EU-SILC data,³⁶ to the best of our knowledge, no specific validation of the 'access to PC' question was performed. Note however that the Eurobarometer survey on health and long-term care (2007)³⁷ used a similar question.

Fourth, the EU-SILC questionnaire does address PC non-utilization, and it is therefore not possible to know if non-users do not use PC services by choice (e.g. people with high SE status who use specialized private care), or because they are not able to do so (e.g. very low SE status people who face major access barriers). Additionally, the non-utilization of health services may not be a function of individual choice, since some choices are not informed due to a lack of education or of culturally acceptable services.³⁸ Hence, even if non-users represented only 1.6% of the sample, our analysis might be biased by considering only the sub-sample of users. In order to evaluate this potential bias, we performed an additional analysis, using a two-stage regression. First, we estimated the predicted probability of the use of PC services for each individual, using a probit regression. Then we replicated the original logistic regressions weighting observations by the inverse predicted probability of being a PC user, from the probit regression. We found no differences in the OR between the two models, i.e. with and without sample weights, which suggests that the results in terms of access to PC are not biased by the non-users (see full results in the [Supplementary Appendix](#)).

Finally, although EU-SILC is a standard and comparable survey that contains a nationally representative samples of individuals aged 16 years and older in 32 European countries, it has some limitations.³⁹ Sampling methods vary across countries, and the non-responses are handled through proxy interviewing and imputation of missing data, in order to complete samples and avoid selection bias. The full information about quality reports of each country is publicly available elsewhere.⁸

Supplementary data

Supplementary data are available at *EURPUB* online.

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Conflicts of interest: None declared.

Key points

- Access to PC improved between 2007 and 2012, and this improvement was greater for people living in countries with a higher investment in health and in PC.
- Low-SE status people report poorer access to PC and this was stable between 2007 and 2012.
- Supportive PC policies are essential especially during economic recession periods; nevertheless, more attention should be given to the reduction of inequalities in access to PC.

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