Inequities in health care utilization by people aged 50+: Evidence from 12 European countries

Abstract

The aim of this study is to describe the magnitude of educational inequities in the use of health care services, by people aged 50+, in 12 European countries, controlling for country-level heterogeneity. We consider four services: having seen or talked to 1) a general practitioner (GP) or 2) specialist, 3) having been hospitalized, and 4) having visited a dentist (only for prevention). Data derived from the SHARE (Survey of Health, Ageing and Retirement in Europe) project, a cross-national panel that collects information from individuals aged 50 and over. A Fixed Effects approach is applied, which is a valuable alternative to the application of conventional multilevel models in country-comparative analysis. The main findings of this study confirm that there is substantial educational inequity in the use of health care, although relevant differences arise between services. A clear pro-educated gradient is found for specialists and dentist visits, whereas no evidence of educational disparities was found for GP use. On the other hand, less clear results emerge regarding hospitalizations. However, the analysis shows that micro-level dimensions, i.e. individual needs and predisposing and enabling population characteristics, and macro level factors, i.e. health care system and welfare regime, interact to determine people's use of health services. It can be concluded that people with more education level have more resources (cognitive, communicative, relational) that allow them to make

more informed choices and take more effective actions for their health goals, however, the institutional context may modify this relationship.

Keywords

Health care services; Health inequities; Healthcare system; Welfare regimes; Educational disparities; SHARE project; Fixed Effects approach; European countries

Introduction

The World Health Organization (WHO) recognizes the right to access to health care as an essential part of human rights. European health systems are based on the principle of equity (Kelley & Hurst, 2006), understood as the provision of equal care for equal needs – horizontal equity – both as different treatments for people with different needs – vertical equity –. In order to attain this goal, most European countries have achieved universal (or near-universal) coverage of health care costs for a core set of services, which usually include consultations with doctors and specialists, tests and examinations, and surgical and therapeutic procedures. Generally, dental care is partially covered (Paris et al., 2010).

Nevertheless, although most countries aim at offering a universal and equal healthcare system, this does not easily translate into equal utilization of care services (European Commission, 2008, p. 75). Many studies have shown that important differences persist in health care services utilization related to individuals' demographic and socioeconomic characteristics. If some population

groups systematically receive different levels of care for the same needs, then we can talk about inequity in health care (Braverman, 2003). In this work we use the concept of inequity rather than inequality. Whitehead (1992) claims that the term 'inequity' refers to differences that are unnecessary and avoidable but, in addition, are also considered unfair and unjust.

A substantial number of studies has documented income-related inequities (Devaux, 2013; Devaux & de Looper, 2012; Manderbacka et al., 2009, Masseria and Giannoni, 2010, van Doorslaer et al., 2004, 2006), educational disparities (Alberts et al., 1997; Or et al., 2008; Stirbu et al., 2011), social class inequalities (Palència et al., 2013), or a combination of these and other factors, such as ethnic group or place of residence (Regidor et al., 2008), in utilization of health care services. These findings confirm those of studies that have focused on socio-economic status (SES) as health determinants (Mackenbach et al., 2003; Wilkinson & Marmot 2003).

According to the theory of "fundamental causes" (Link & Phelan, 1995; Phelan et al., 2010), SES is related to disease outcomes because individuals deploy resources (such as knowledge, money, power, etc.) to avoid risks and to adopt protective strategies. Therefore, we can assume that people with greater resources are better able to use health care services in order to improve their health than people with lower SES. A lesser utilization of certain health services may result in poorer health status for the population affected. Inequities in the use of health care services enhance the risk of disease and increase social disparities in health, as well as having serious effects in social financial terms (Dahlgren & Whitehead, 2007). In this perspective, a key resource is education that we already know to be an excellent predictor of health conditions (Marmot,

2005; Muller, 2002; Ross & Wu, 1996). Less educated patients would face cultural and informational barriers and have a lack of incentives, which explain their reluctance to use health care (Alberts et al., 1997; Couffinhal et al., 2005).

At the same time, a comparative analysis shows that the degree of inequity in health care use seems to vary among countries according to different models of healthcare systems and welfare regimes (Eikemo et al., 2008). Therefore, not only the individual level but also the contextual level plays an important role in studying health care services inequities. An efficient health care system, i.e. its policy, resources and organization, can contribute to the crucial goal of societal well-being (Figueras, 2009). Wendt (2009), for example, identifies three fundamental dimensions and related indicators to construct a typology of healthcare systems: financing, health service provision and regulation. The construction of types helps to better explain how healthcare systems differ from each other and, more interesting, it shows how access to healthcare is related to institutional characteristics that vary among countries (Wendt, 2009, p. 433).

Even different assets of welfare regimes established at the national level can be associated with macro-economic characteristics and can be accountable for improving (or not) people's health. Welfare regimes may "decommodify" individuals to varying degrees and mitigate social vulnerabilities (Esping-Andersen, 1990; Layte & Whelan, 2002), a condition of weakness exposing individuals to different risk factors, such as illness, unemployment, etc.

This study focuses on the principle of horizontal equity in the utilization of health care services. In particular, the aim is to describe the magnitude of educational disparities in having seen or talked to a general practitioner (GP) or specialist, having been hospitalized and having visited a dentist (only for routine

control or prevention) by people aged 50+, in 12 European countries, controlling for country-level heterogeneity.

Operationalization of variables and analysis of this work are based on Andersen's model of health care utilization behavior, which was initially developed in the 1960s (Andersen, 1968), later revised and supplemented (Aday & Awe, 1997; Aday et al., 2004; Andersen, 1995). This perspective suggests that people's use of health services is a function of their predisposition to use services factors, which enable or impede use, and their need of care (Andersen, 1995, p. 1). In this context, micro-level dimensions, that is predisposing (i.e. age, gender, etc.) and enabling (i.e. education, income, etc.) population characteristics, individual needs (i.e. health status), personal health practice (i.e. smoking, drinking, etc.) and macro-level factors, such as healthcare system organization, interact to determine people's use of health services.

The present paper differs in some respects from previous analysis on this issue. First, it uses data derived from the SHARE (Survey of Health, Ageing and Retirement in Europe) project, which provides ex-ante and ex-post harmonized data, whereas many comparative studies on health care utilization use data from national health interview surveys (Devaux & de Looper 2012; Stirbu et al., 2011; van Doorslaer et al., 2004, 2006). Second, the sample of the study is composed of individuals aged 50 and over. It is well documented in the literature that more socio-economically vulnerable people, as are the elderly, have more frequent health demand (Dalstra et al., 2006) and this may play a role in structuring health inequalities. Third, it extends the range of variables specified in the models investigated to include past period of ill-health and personal health practices such as physical activity, smoking, drinking, or self care such as regular

blood test or blood pressure check, which may affect the chance of using health care services. Finally, given the limited number of countries available, it applies a Fixed Effects approach, which is a valuable alternative to the application of conventional multilevel models in country-comparative analysis. This approach is useful in analyzing data from international surveys with a low number of country-level unit and it avoids the country-level omitted variable bias by controlling for country-level heterogeneity (Möhring, 2012).

Data

We used data from SHARE, a cross-national panel database of micro data on health, socio-economic status and social and family networks of individuals aged 50 and over. We merged 2007 wave 2, which makes available the highest and complete set of questions on respondent's health, health care use and socio-economic status and 2009 wave 3 (SHERLIFE), a retrospective survey, which has collected data on people's life histories interviewed in previous waves. Our sample covers 12 countries: Sweden, Netherlands, Denmark, Germany, France, Switzerland, Belgium, Spain, Italy, Greece, Czech Republic and Poland.

Individuals retention rate varies among countries (about 60% in Germany and about 90% in Greece), but no consistent gender or age attrition bias has been found across SHARE countries (Blom & Schöder, 2011).

As known, the reliability of any retrospective survey is based on the accuracy of collected information. Memory bias can constitute a serious problem in the analysis of retrospective data. Analysis conducted by Garrouste and Paccagnella (2011) highlight SHARELIFE data is overall strongly consistent with the

information reported at the time of occurrence of the events (with less than 10% recall errors over all events).

After deleting missing cases on the variables of interest, there are 16,431 cases available for analysis (samples used in analysis by country are shown in Table 1A of the online Appendix [INSERT LINK TO ON LINE FILES] accompanying this article).

Methods

In the models, the dependent variables are respondent's contacts with general practitioner and specialist (seen or talk, therefore some of the visits may have included telephone consultations), with a dentist (seen) only for routine controls or prevention and overnight hospitalization in specialized wards (medical, surgical, psychiatric) in the last 12 months. All four dependent variables are dichotomous (yes, no).

It must be emphasized that country comparison in utilization of different care services requires caution, because some of them are usually guaranteed by the National Health Service (NHS), such as visits to a GP, whereas others are not always guaranteed, for example dentist visits. Moreover, some services can be freely chosen, such as dentist control visit, while others, such as emergency hospitalization, cannot be always planned.

It should also be noted that while individuals may self-refer for primary care services, specialty health services usually require referral from a GP. In this case, a GP operates as a gatekeeper for secondary health services utilization. Unfortunately, in data it cannot separate health service utilization into individual

choice to see a specialist and specialist visit referred by a GP, although we are aware that this distinction may improve the understanding of SES on health care use (Dunlop et al., 2000).

In the context of Andersen's model, at the micro level, there are four key dimensions related to health care utilization: individual needs, predisposing and enabling population characteristics, and personal health practice. The concept of need is very ambiguous (Curley, 1992; Goddard & Smith, 2001), although it is recognized as the fundamental factor to explain the use of health care services (Aday et al., 2004). In this study need is defined as the reported individual disease condition (i.e. his or her health status), such as chronic ills or symptoms (perceived need) (Aday & Awe, 1997). Three variables are included in the models to control for this crucial dimension: self-assessed health is rated according to a five-point scale from excellent to poor; chronic diseases, which summarized the number of chronic diseases reported by individuals, such as cancer, osteoporosis, Parkinson disease (none, one or more); health symptoms, which register health problems faced by respondents in the last six months, such as persistent cough, heart trouble or angina, swollen legs (none, one or more).

Predisposing factors also included three variables: age (years), sex (female, male) and past periods of ill-health (yes – as an adult, ill longer than a year and which seriously affected respondent's daily life, such as cancer, diabetes and etc. –, no). Enabling factors were educational level (0-8 years of schooling, 9-13 and 14 or more. We know that older people have a lower level of education than younger. For this reason, the highest class, 14-25 years of schooling, is very broad); household income (2007 PPP) and health insurance (totally or in part paid by the respondent, fully paid by private or social insurance. Only in models

related to hospitalization, health insurance was operationalized in two distinct variables, in order to distinguish between private and public hospital coverage).

Personal health practices refer to those actions by which individuals can avoid diseases, promote self-care and make choices that enhance health. They could influence health care utilization because some virtuous behaviors can prevent the onset of diseases, or, on the contrary, increase the risk of developing health problems. Five variables have been included in the analysis: smoking (yes, no); heavily drinking (yes – consumed at least four drinks a day for three/four days a week in the last three months –, no); regular blood test at least last ten years (yes, no); regular blood pressure checks at least last ten years (yes, no); and physical activity in daily life (yes – vigorous or moderate –, no).

In order to control for country-level heterogeneity related to health systems, three variables are taken into account: total expenditure on health as percentage of gross domestic product; total hospital beds, per 1000 population; and physicians, density per 1000 population (head counts). An additional macro-level variable considered is the type of welfare regime. Our study categorizes countries considered into three regimes based upon Ferrera's (1996) classification (in the survey there is no country belonging to Anglo-Saxon welfare regime, i.e. UK or Ireland), plus an additional category for Eastern Europe. The 12 countries have been classified as: Scandinavian (Sweden, Netherlands and Denmark), Bismarckian (Germany, France, Switzerland and Belgium), Southern (Spain, Italy and Greece) and Post-socialist (Czech Republic and Poland).

Basic health insurance coverage and the amount of copayment for the four services considered vary among the 12 countries analyzed (Paris et al., 2010, pp. 19-20). As each country has its own specificity, the health insurance coverage

differs also for countries with the same welfare regime. In general, we can affirm that Scandinavian (in particular Netherland and Denmark) and Southern (specifically Spain and Italy) models have a higher coverage than Bismarckian regime for GP, specialist and hospitalization, whereas dentist visits are only partially cover in all countries (with the exceptions of Spain and Poland).

Descriptive statistics of the dependent and predictor variables are shown in Table 2A of the online Appendix [INSERT LINK TO ON LINE FILES].

Ethical approval for the study was granted from Ethics Council of the Max-Planck-Society for the Advancement of Science (MPG).

Analysis

Given the hierarchical nature of the data, with individuals nested in countries, the obvious choice would be to use multilevel regression models. However, multilevel models are associated with some problems when the estimated models have a small number ($N<30$) of macro-level units (Bryan & Jenkins, 2013). First, a small sample size at level two leads to biased estimates of second-level standard errors (Maas & Hox, 2005). Second, as a consequence of the low number of degrees of freedom on the country-level, only a small number of macro indicators can be controlled for, therefore country-level estimators of these models are affected by omitted variables bias (Möring, 2012). Third, the introduction of random slope and cross-level interaction effects in models is difficult to implement for statistical reasons (Allison, 2009).

In this study we use the Fixed Effects approach (Allison, 2009), an alternative to the application of multilevel methods for country comparisons when the number

of second-level units are small. As Möring (2012, p. 5) writes: " [...] *fixed effects models are fruitful for analyses with a small number of countries to examine the effect of individual-level variables — [...] — and of cross-level interactions controlling for other factors and 'random noise' related to the country level. ".*

Compared to a multilevel model, in a fixed effects approach a country-specific error term is explicitly estimated in the model and it belongs to the fixed part of the equation. Formally:

$$y_{ij}=\gamma_{00}+\beta_1 x_{1ij}+\cdots+\beta_k x_{kij}+\boldsymbol{\delta_1 x_{1ij} u_{j1}}+\cdots+\boldsymbol{\delta_{N-1} x1_{ij} u_{j}}_{N-1}+\alpha_1 u_{j1}+\cdots+\alpha_{N-1} u_{jN-1}+e_{ij}$$

with

y_{ij}: Individual-level dependent variable of observation i in country j

γ_{00}: Intercept over all countries (the country specific intercept γ_{0j} equals $\gamma_{00} + u_j$)

x_{kij}: Independent individual-level variable number k of observation i in country j

β_k: Coefficient of individual-level variable number k

u_j: Error term for each country j

e_{ij}: Error term for observation i within country j

For each dependent variable four models have been estimated.

Model 1 (M1) is calculated simply to test how much variance is explained from the second level. To do this, M1 only includes N-1 dummy variables for countries. Adjusted R^2 indicates the percentage of variance due to the country level.

Model 2 (M2) adds the independent variable (education) and micro-level predictors (individual variables).

Model 3 (M3) tests if the effect of education varies across countries, i.e. what is called "slope effect" in multilevel models. In M3 interaction terms of education and country dummies are added.

Model 4 (M4) adds the cross-level interaction effect, i.e. interactions between micro and macro variables. In the Fixed Effects model it is not possible to include the main effect of macro variables: the country dummies use all variance at the country level, so no variance remains to be explained by additional country-level variables. In this respect, macro cross-level interaction allows estimating the moderator effect of macro variables on individual characteristics.

Results

Individual's self-assessed health adjusted for age is very different across European countries considered in this study (Figure 1).

[Figure 1]

Needs is the key factor to explain the utilization of health care services, therefore we expect to find significant differences in use of health care across countries (Figure 2): where health status is worse, the use of health care services is greater (exceptions are France and Belgium that record high self-assessed health and at the same time high rate of using health care services). In all countries, the percentage of individuals who have seen or talked to a GP is high. As regards visits to specialists, differences among countries are more marked than visits to a GP. Regarding hospitalization, the highest values are observed in France and

298 Denmark; on the contrary Spain and Poland show the lowest percentages.
299 Finally, people of Nordic countries and Germany visited a dentist more
300 frequently than other countries.

301 [Figure 2]

302

303 The results of multivariate models M1 and M2 are shown in Tables 1 and 2.
304 Variance explained by country level as indicated by R^2 of M1 is low for three of
305 the four dependent variables, i.e. GP (4.9%), specialist (3.0%) and hospitalization
306 (1.2%), whereas it is fair for prevention by a dentist (9.3%).

307

308 [Table 1]

309

310 In M2, which also includes individual-level variables, explained variance
311 increases appreciably for all health care services analyzed. It rises to 14.7%,
312 10.5%, 10.0% and 11.7% respectively. It is tested whether micro-level variables
313 introduced in M2 significantly improve the fit of model compared to M1. For this
314 purpose it is used a likelihood-ratio test.. According this test, for all four
315 dependent variables M2 improves the prediction compared to M1 (Table 2).
316 The effect of education on utilization of health care services is shown in Table 2.
317 Individuals in different education groups display no difference in the probability
318 of making at least one GP visit. In contrast, a clear gradient is found when
319 considering visits to a specialist: individuals with higher level of education are
320 more likely to see or talk to a specialist, compared to individuals with lower
321 education. The same gradient has been found for visits to dentists, whereas the

probability of being hospitalized is higher only for individuals with 14 years or more of education.

Need predictors have a strong association with the use of health care services. Individuals with bad health conditions are more likely to visit a GP and specialist or to be hospitalized than those in good health. On the other hand, the association between needs and visits to a dentist is negative: people with bad health, with the exception of chronic diseases, which is not statistically significant, have less probability to visit a dentist for prevention than individuals with no health problems.

[Table 2]

Also, predisposing factors are related to utilization of health care, but the direction and magnitude of association differ on the basis of health care services considered. In particular, older people are more likely to visit a GP and use hospital services, whereas they have less probability to visit a specialist and a dentist compared to younger individuals.

A final set of variables included in the model is related to personal health practices. Smoking reduces the probability using health care services, as well as people who drink heavily are less likely to visit a GP or specialist. Individuals who have regular blood tests are more likely to visit a specialist or to be hospitalized, whereas those who regularly check their blood pressure are more likely to visit a GP and dentist. Lastly, physical activity increases the probability of visiting a GP and hospitalization, but it reduces the likelihood to visit a specialist and a dentist.

Model 3 includes interaction effects of the country dummies and individual education (see Table 3A in Appendix [INSERT LINK TO ON LINE FILES]). These interaction effects ("slope effect"), allow evaluating if the impact of education varies among countries. According to the likelihood-ratio test, M3 improves the prediction compared to M2 for GP, specialist and dentist visits, but not for hospitalization. Figure 3 reports the predictive margins of education and country interaction as indicated by Model 3. The effect of education differs slightly among countries for visits to a GP. This disparity is more noteworthy for specialists and dentist visits. In general, for these services we observe that more educated people use health care more than those with only 0-8 years of education. In contrast, very small differences are observed in hospitalization, with the exception of Greece. However, interaction effects contribute very slightly to explain the differences in utilization of health care services. Increase of explained variance in passing from M2 to M3 is very modest (see R^2 value in Table 3A in Appendix [INSERT LINK TO ON LINE FILES]). Also, for hospitalization and dentist the main effect of education is no more significant when interactions with countries are included.

[Figure 3]

Finally, M4 includes interaction between education and four macro-variables (see Table 4A in Appendix [INSERT LINK TO ON LINE FILES]). It tests the moderator effect of context on the relationship between education and use of health care services. After the introduction of macro-variables, the main effect of

education is no more significant for hospitalization, dentist and GP (but only for people with 14 years or more of education).

Figure 4 reports average marginal effects for interaction between total expenditure on health as a percentage of GDP and education. Only for visits to specialists we note statistically significant differences between less and more educated; therefore, health expenditure moderates the individual-level effect. Since the interaction is negative, the higher the expenditure on health of a country, the less likely higher-educated people visit a specialist. It is interesting to stress that GP and hospitalization parameters are at the limit of statistical significance: in countries with more expenditure on health people with higher education levels tend to visit a GP or to be hospitalized more often than less educated.

[Figure 4]

Regarding total hospital beds per 1000 population, only for visits to specialists the effect of education is modified by hospital beds density (Figure 5). In this case people with more than eight years of education visit a specialist more often than lower-educated (we found a similar pattern for visits to dentists, although estimated coefficients are at the limit of statistical significance). Note that this indicator does not have any moderator effect on hospitalization.

[Figure 5]

The third macro-level indicator related to the efficiency of the health care system is physicians' density. This indicator seems to have a moderator effect only for visits to dentists (Figure 6): the greater the number of physicians of a country, the more educated people (i.e. with 14 or more years of education) visit a dentist less frequently.

[Figure 6]

The last macro-level variable considered is welfare regime. Figure 7 reports the predictive margins of interaction between welfare regime and education for health care services analyzed. First, the interaction effect does not show any statistical significant impact on the probability of hospitalization. Second, more educated people visit a GP more often than less educated only in the Post-socialist regime. Third, for specialist, the interaction effect is positive for Scandinavian, Bismarckian and Southern models, whereas it is negative in the Post-socialist regime. Finally, individuals with more education have a greater likelihood to visit a dentist in Scandinavian and Southern regimes than people less educated; but in Bismarckian and Post-socialist regimes we do not observe any difference.

[Figure 7]

Discussion

The main findings of this study confirm that there is still inequity in the use of health care, although relevant differences arise among services. In accordance with many previous studies (van Doorslaer et al., 2004; Palencia et al., 2013; Stirbu et al., 2011), after adjusting for needs, enabling and predisposing factors, no evidence of variation in the use of GP visits is found on the basis of level of education. It should be noted that in many healthcare systems, a GP is the point of access to other health care services and that individuals are used to having a trusting relationship with their GP (Stokes et al., 2005).

In contrast, specialist visits show a clear gradient, with more educated individuals using services more often than less educated. Less educated people encounter barriers due to communication (Willems et al., 2005) that they do not usually face when they speak with a GP. A more formal relationship than with a GP makes them feel less confident and competent of being able to communicate their needs to a specialist and, at the same time, to understand their health condition. In this context, a crucial role is played by "health literacy", as defined by WHO (1998).

Results show that a gradient is also found for visits to dentist. In this paper only prevention or routine control is been considered, therefore enabling factors, as is education, more than needs are a key factor to use this service (Listl, 2011). As Meyerhoefer et al. (2014) stress, education is strongly related to the use of all types of dental services and preventive services in particular.

Analysis shows that the chance to have been hospitalized in the last 12 months increases for people with the highest level of education (14 years or more).

These results agree with those of de la Hoz and Leon (1996) for Spain, whereas Morris et al. (2005) did not find any clear gradient in England, but they are in contrast with the findings of Regidor et al. (2008) for Spain and with those of Keskinmãki et al. (1995) in Finland, who found that people in the lowest SES were more likely to use public hospitalization than those in the highest SES.

Inequity in the use of secondary care services is substantial. People with more education have more resources (cognitive, communicative, relational, economic) that allow them to make more informed choices and take more effective actions for their health goals (McMahon, 1997).

Furthermore, those of higher education may have different attitudes about the benefits that can be realized by accessing specialist care or hospitalization and may in turn be more motivated to seek opportunities by requesting specific physician visits or hospital treatments. If, as Link and Phelan (1995, p.88) stress, resources are important risk factor determinants, "fundamental causes" are linked to multiple disease outcomes through multiple factor mechanisms. One of these could be the ability to use health care services. So we can suppose that if specialized services are essential to maintaining and enhancing the stock of health, then it follows that socio-economic advantage (i.e. more education) enables an increased capacity to produce and sustain positive health due to greater resources available to individuals with higher SES.

On the other hand, we wondered if the effect of education on utilization of health care services might be moderated by context. Inclusion of macro-variables, i.e. characteristics of the healthcare system and welfare regime, allow controlling for country-level heterogeneity. Restricted to variables used in this study, characteristics of the healthcare system seem to be limited.

In countries with higher total expenditure on health, more educated people reduce specialist visits and increase GP care and hospitalization (although the latter is not statistically significant). We can hypothesize that a large amount of economic resources improves the quality, among other things, of primary care services and this increases the confidence of higher-educated people in turning to a GP. At the same time, the hospital becomes the access point of secondary care services for more educated people. Overall, this appears to result in a shift of inequity from specialist care (see Model 4, Figure 4) to GP care.

Also the density of hospital beds shows a significant effect only on visits to specialists, but in this case the sign is positive. This effect has to be interpreted with caution because it could be spurious. In fact, in many countries specialists work in hospitals, therefore a greater density of hospital beds means also a large number of specialists. As mentioned above, higher-educated people are more likely to visit specialists, so the effect of density of hospital beds could simply reflect the large number of specialists in a territory.

Physicians' density does not show a significant moderator effect on the observed association between education and use of health care services. The only exception is higher-educated people who are less likely to visit a dentist than lower-educated as physicians' density increases. As some studies have shown (Murthy, 2007), the greater the physicians' density, the better the health status. So it can be supposed that more educated people, who take more advantage of accessing health care services, improve their health more than less educated individuals when physicians' density increase. Therefore they could have less need to visit a dentist (even for preventive cures).

494 We have also observed whether and how the type of welfare regime changes the
495 association between education and use of health care.
496 If we look at a GP visits in countries with a Post-socialist regime higher-educated
497 individuals are more likely to visit a GP. No differences on the basis of
498 educational level emerge for other welfare models. On the other hand, Post-
499 socialist welfare regimes are the only ones in which the more educated (with 9-
500 13 years of education) show less chance to undergo specialist care, whereas the
501 opposite is true for other welfare regimes. In particular, for specialists the
502 magnitude of inequalities is higher in the Scandinavian regime. About the
503 probability of hospitalization, the type of welfare regime does not have any
504 moderator effect on education. In the Scandinavian and Southern models, more
505 educated individuals are likely to use preventive dental care than lower-
506 educated. These results are somewhat surprising and contradict the widely held
507 opinion that Scandinavian countries have the lowest level of inequity. Given that
508 Scandinavian welfare states provide the most extensive welfare provision, we
509 would have expected that they were some of the best-performing countries in
510 terms of the degree of health equity. Eikemo et al. (2008, p. 578) found similar
511 findings in their study, and consider relative deprivation, class-related health
512 behaviors and social exclusion may be factors behind these results. In contrast,
513 in countries with the Bismarckian welfare regime health inequalities are the
514 smallest for all health services analyzed.
515 In this article the sample consists of individuals 50 years of age and more. Older
516 people are a growing proportion of the population as a consequence of a fast
517 increase in life expectancy (McMunn et al., 2006). Moreover, it is well known that
518 older adults use health services more often than younger ones and that health

519 service use increases as age increases (European Commission, 2011). Despite the
520 aid of modern technology, healthier lifestyles and better education, it is expected
521 that the demand of health care services will continue to grow (Mayhew, 2000),
522 and this could have serious implications for population health.
523 This study has some limitations.
524 First, using education as an indicator of socioeconomic position has some
525 advantages but also some drawbacks (Stirbu et al., 2011, p. 5). Among the latter,
526 we should mention that older people achieved their level of education many
527 years ago; therefore it might not accurately indicate their current socioeconomic
528 position (Huisman et al., 2005).
529 Second, this study is based on secondary analysis of self-reports of use of health
530 care. Older people have higher memory bias than younger and this could be a
531 serious problem in the analysis of retrospective data. Third, for GP and specialist
532 care, visits include also talking with doctor (by phone for example). This remark
533 is related to impossibility in this study to control for quality of visits. Therefore,
534 the analysis is limited to establish if there has been a contact between GP or
535 specialist and patient in the last 12 months. Fourth, the sample sizes of countries
536 under study are small for some of them (i.e. Czech Republic, Switzerland, Poland)
537 and this can lead to biased estimates.
538 Despite these limits, this study offers advances, in terms of new data analyzed,
539 new variables included, and new methods used.
540 In European countries the utilization of health care services is greater for higher
541 educated groups at equal levels of need. Assuming that equity in utilization of
542 health care contribute to improve health (Mackenbach, 2003), social and health
543 policies should try to remove the consistent educational gradient observed. This

544 could be achieved by measures at the demand side (i.e. enhancing “health
545 literacy”, explaining advantages of specialist/dental care), although it is needed
546 to investigate in-depth the barriers to the use of secondary care services among
547 patients with lower education in order to develop effective health promotion
548 policies.
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550 References

Aday, L.A., & Awe, W.C. (1997). Health services utilization models. In D.S. Gochman (Ed.), *Handbook of health behavior research: personal and social determinants* (pp. 153–72). New York: Plenum Press.

Aday, L.A., Begley, C.E., Lairson, D.R., & Balkrishnan R. (2004). *Evaluating the healthcare system: effectiveness, efficiency, and equity*. Chicago, IL: Health Administration Press; Academy Health.

Alberts J.F, Sanderman, R., Eimers, M.J., & Van de Heuvel W.J.A. (1997). Socioeconomic inequity in health care: a study of services utilization in Curaçao. *Social Science & Medicine*, 45 (2), 213-220.

Allison, P.D. (2009). *Fixed Effects Regression Models*. Los Angeles, CA: SAGE Publications, Inc.

Blom, A.G., & Schröder M. (2011). Sample Composition 4 Years on: Retention in SHARE Wave 3 in Retrospective Data Collection. In M. Schröder (Ed.), *The Survey of Health, Ageing and Retirement in Europe. SHARELIFE Methodology*. Mannheim: Mannheim Research Institute for the Economics of Ageing (MEA).

Braveman, P.A. (2003). Monitoring Equity in Health and Healthcare: A Conceptual Framework. *Journal of Health, Population and Nutrition*, 21(3), 181-192.

Bryan, M. L., & Jenkins S. P. (2013). Regression analysis of country effects using multilevel data: A cautionary tale. *ISER working paper series 2013-14*.

Cora, J., Maas, M., & Hox J.J. (2005). Sufficient Sample Sizes for Multilevel Modeling. *Methodology*, 1 (3), 86–92.

Couffinhal, A., Dourgnon, P., Geoffard, P.Y., Grignon, M., Jusot, F., Lavis, J., Naudin, F., & Polton D. (2005). Policies for reducing inequalities in health, what role can the health system play? A European perspective. Part I: Determinants of social inequalities in health and the role of the healthcare system. *Issues in health economics IRDES*, 92.

Culyer, A. J. (1995). Need - the idea won't do - but we still need it. *Social Science & Medicine*, 40, 727–730.

Dahlgren, G., & Whitehead, M. (2007). A framework for assessing health systems from the public's perspective: the ALPS approach. *International Journal of Health Services*, 37(2), 363–378.

Dalstra, J.A.A., Kunst, A.E., & Mackenbach, J. P. (2005). A comparative appraisal of the relationship of education, income and housing tenure with less than good health among the elderly in Europe. *Social Science & Medicine*, 8, 2046–2060, doi:10.1016/j.socscimed.2005.09.001

Devaux, M. (2013). Income-Related Inequalities and inequities in health care services utilisation in 18 selected OECD Countries. *European Journal of Health Economics,* DOI 10.1007/s10198-013-0546-4

Devaux, M., & de Looper, M. (2012). Income-Related Inequalities in Health Service Utilisation in 19 OECD Countries, 2008-2009. *OECD Health Working Papers*, No. 58, OECD Publishing. doi: 10.1787/5k95xd6stnxt-en

Dunlop, S., Coyte, P.C., & McIsaac, W. (2000). Socio-economic status and the utilisation of physicians' services: results from the Canadian National Population Health Survey. *Social Science & Medicine*, 51, 123-133.

Eikemo, T.A., Huisman, M., Bambra, C.., & Kunst, A.E. (2008). Health inequalities according to educational level in different welfare regimes: a comparison of 23 European countries. *Sociology of Health & Illness*, 30 (4), 565–582, doi: 10.1111/j.1467-9566.2007.01073.x

Esping-Andersen, G. (1990). *The Three Worlds of Welfare Capitalism*. London: Polity Press. Available from http://ess.nsd.uib.no

European Commission (2001). *Budgetary challenges posed by ageing populations: the impact of public spending on pensions, health and long-term care for the elderly and possible indicators of the long-term sustainability of public finances*. Brussels: European Commission, Economic Policy Committee.

European Commission (2008). *Joint report 2008 on social protection and social inclusion*. Luxembourg: Office for Official Publications of the European Communities.

Fernandez de la Hoz, K., & Leon, D.A. (1996). Self-Perceived Health Status and Inequalities in Use of Health Services in Spain. *International Journal of Epidemiology*, 25 (3), 593-603.

Ferrera, M. (1996). The 'Southern' Model of Welfare in Social Europe. *Journal of European Social Policy*, 6, 17–37.

Figueras, J., Lessof, S., McKee, M. et al. (2009). *Health Systems for Health, Wealth and Societal Well-being*. Copenhagen: WHO Regional Office for Europe on behalf of the European Observatory on Health Systems and Policies.

Garrouste, C., & Paccagnella, O. (2011). Data Quality: Three Examples of Consistency Across SHARE and SHARELIFE Data in Retrospective Data Collection. In M. Schröder (Ed.) *The Survey of Health, Ageing and Retirement in Europe. SHARELIFE Methodology*, Mannheim: Mannheim Research Institute for the Economics of Ageing (MEA).

Goddard, M., & Smith, P. (2001). Equity of access to health care services: Theory and evidence from the UK. *Social Science & Medicine*, 53, 1149–1162.

Gulliford, M., & Morgan, M. (Eds.) (2013). *Access to Health Care*. London: Routledge.

Huisman, M., Kunst, A.E., Bopp, M., et al. (2005). Inequalities in cause-specific mortality in middle-aged and older men and women in eight western European populations. *Lancet*, 365 (9458), 493-500.

Kelley, E., & Hurst, J. (2006). Health Care Quality Indicators Project: Conceptual Framework Paper. *OECD Health Working Papers*, No. 23, OECD Publishing, Paris.

Keskimäki, I., Salinto, M., & Aro S. (1995). Socioeconomic equity in Finnish hospital care in relation to need. *Social Science & Medicine*, 41 (3), 425-431.

Layte, R., & Whelan, C.T. (2002). Moving in and out of poverty: The impact of welfare regimes on poverty dynamics in the EU, *EPAGWorking Paper 2002-30*, Colchester: University of Essex.

Listl, S. (2011). Income-related Inequalities in Dental Service Utilization by Europeans Aged 50+. *Journal of Dental Research*, 90 (6), 717-723.

Mackenbach, J. P. (2003). An analysis of the role of health care in reducing socioeconomic inequalities in health: The case of the Netherlands. *International Journal of Health Services*, 33 (3), 523–541.

Mackenbach, J., Bos, V., Anderse, O., Cardano, M., Costa, G., Harding, S., Reid, A., Hemstrom, O., Valkonen, T., & Kunst A. (2003). Widening socioeconomic inequalities in mortality in six western European countries. *International Journal of Epidemiology*, 32, 830-837.

Manderbacka, K., Arffman, M., Leyland, A., Mccallum, A., & Keskima, I. (2009). Change and persistence in healthcare inequities: Access to elective surgery in Finland in 1992–2003. *Scandinavian Journal of Public Health*, 37, 131–138.

Marmot, M. (2005). Social determinants of health inequalities. *The Lancet*, 365(9464), 1099-1104.

Masseria, C., & Giannoni, M. (2010). Equity in access to health care in Italy: a disease-based approach. *European Journal of Public Health*, 20 (5), 504–510.

Mayhew, L. (2000). Health and elderly care expenditure in an aging world. *Research report RR-00-021.* Laxenburg, Austria: International Institute for Applied Systems Analysis.

McMahon, W.W. (1997). Conceptual Framework for Measuring the Total Social and Private Benefits of Education. *International Journal of Educational Research*, 27 (6), 453-81.

McMunn, A., Breeze, E., Goodman, A., Nazroo J., & Oldfield Z. (2006). Social determinants of health in older age. In Marmot M. and Wilkinson R. G (Eds.) *Social determinants in health*, New York: Oxford University Press.

Meyerhoefer, C.D., Zuvekas, S.H., & Manski R. (2014). The demand for preventive and restorative dental services. *Health Economics*, 23 (1), 14–32.

Möring, K. (2012). The fixed effect as an alternative to multilevel analysis for cross-national analyses. *GK Soclife Working Papers Series*.

Morris, S., Sutton, M., &Gravelle H. (2005). Inequity and inequality in the use of health care in England: an empirical investigation. *Social Science & Medicine*, 60, 1251–1266.

Muller, A. (2002). Education, income inequality, and mortality: A multiple regression analysis. *British Medical Journal*, 324(7328), 23-25.

Murthy, V.N. R. (2007). Income Distribution and Health Status: Econometric Evidence from OECD Countries. *American Journal of Applied Sciences*, 4 (4), 192-196

Or, Z., Jusot, F., & Yilmaz, E. (2008). Impact of health care system on socioeconomic inequalities in doctor use. I*RDES, Working Paper,* n. 17.

Palència, L., Espelt, A., Rodríguez-Sanz, M., Rocha, K.B., Pasarín, I.M., &Borrell, C. (2013). Social Class Inequalities in the Utilization of Health Care and Preventive Services in Spain, a Country with a National Health System. *European Journal of Health Economics*, 14, 211-219.

Paris, V., Devaux, M., & Wei, L. (2010). Health Systems Institutional Characteristics: A Survey of 29 OECD Countries. *OECD Health Working Papers*, No. 50, OECD Publishing. doi: 10.1787/5kmfxfq9qbnr-en

Regidor, E., Martínez, D., Calle, M.E., Astasio, P., Ortega, P., & Domínguez, V. (2008). Socioeconomic patterns in the use of public and private health services and equity in health care. *BMC Health Services Research*, 8, 183.

Ross, C.E., & Wu, C. (1996). Education, age, and the cumulative advantage in health. *Journal of Health and Social Behavior*, 37(March), 104-120.

Stokes, T., Tarrant, C., Mainous III, A.G., Schers, H., & Freeman, G.R. (2005). Continuity of Care: Is the Personal Doctor Still Important? A Survey of General Practitioners and Family Physicians in England and Wales, the United States, and the Netherlands. *Annals Of Family Medicine*, 3 (4), 353-359.

van Doorslaer, E., & Masseria, C. (2004). Income-related Inequality in the Use of Medical Care in 21 OECD Countries. *OECD Health Working Paper*, No. 14, Paris: OECD.

van Doorslaer, E., Masseria, C., & Koolman, X. (2006). Inequalities in access to medical care by income in developed countries, *CMAJ*, 174 (2), 117-183.

Vikum, E., Håkon Bjørngaard, J., Westin, S., & Krokstad, S. (2013). Socio-economic inequalities in Norwegian health care utilization over 3 decades: the HUNT Study. *European Journal of Public Health*, 23 (6), 1003-1010.

WHO (1998). Health Promotion Glossary. World Health Organization.

Wendt, C. (2009). Mapping European healthcare systems: a comparative analysis of financing, service provision and access to healthcare. *Journal of European Social Policy*, 19 (5), 432-445.

Whitehead, M. (1992). The concepts and principles of equity and health. *International journal of health services*, 22, 429-445.

Wilkinson, R.G., & Marmot, M. (2003). *Social determinants of health: The solid facts* (2nd ed.). Retrieved from http://www.euro.who. int/document/e81384.pdf

Willems, S., De Maesschalck, S., Deveugele, M., Derese, A., & De Maeseneer, J. (2005). Socio-economic status of the patient and doctor–patient communication: does it make a difference?. *Patient Education and Counseling*, 56 (2), 139–146.

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Tables

Table 1. Fixed Effect Model 1, use of health care services in European countries. Beta values, standard errors and fit statistics.

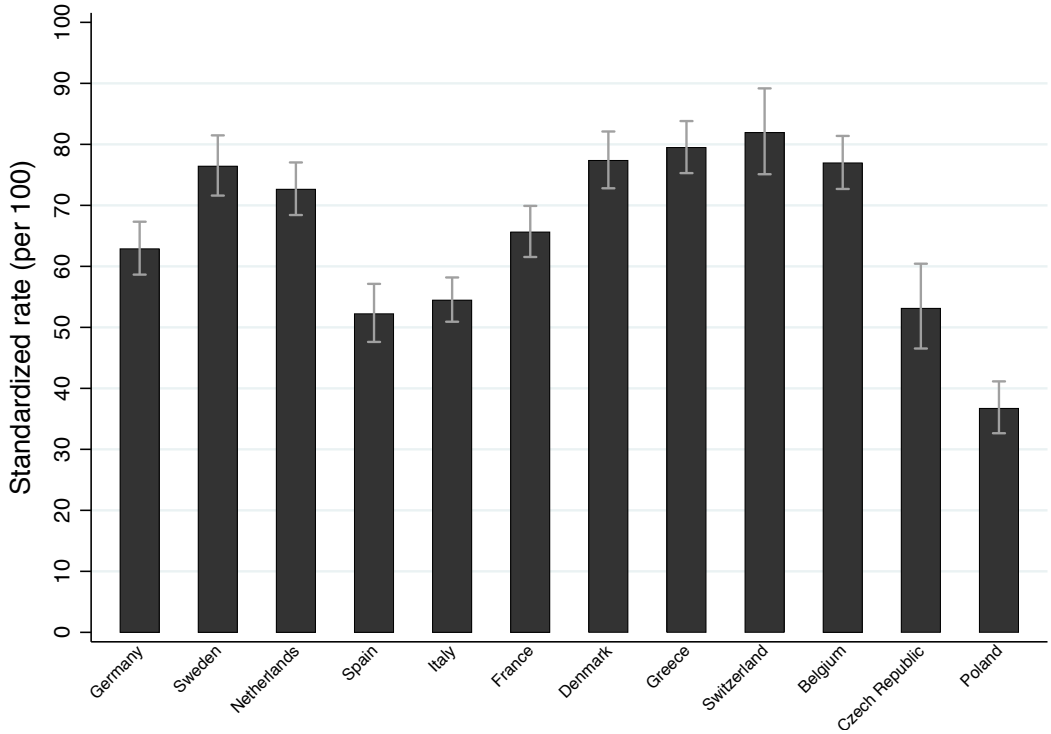
MODEL 1	GP	SPECIALIST	HOSPITALISATION	DENTIST
Country				
Germany	Rif.	Rif.	Rif.	Rif.
Sweden	-0,944 (0,098)	-0,933 (0,081)	-0,389 (0,131)	0,247 (0,082)
Netherlands	-0,660 (0,096)	-0,782 (0,077)	-0,523 (0,140)	-0,050 (0,079)
Spain	-0,041(0,113)	-0,875 (0,084)	-0,192 (0,128)	-1,610 (0,117)
Italy	-0,012 (0,101)	-0,355 (0,074	-0,137 (0,113)	-1,257 (0,091)
France	0,754 (0,122)	-0,210 (0,077)	0,004 (0,117)	-1,148 (0,094)
Denmark	-0,266 (0,101)	-1,603 (0,084)	-0,288 (0,120)	0,540 (0,078)
Greece	-1,025 (0,092)	-1,010 (0,075)	-0,973 (0,131)	-1,481 (0,095)
Switzerland	-0,698 (0,112)	-0,987 (0,094)	-0,347 (0,145)	-0,061 (0,096)
Belgium	0,497 (0,105)	-0,229 (0,071)	0,027 (0,108)	-0,708 (0,079)
Czech Republic	0,263 (0,143)	-0,356 (0,097)	-0,061 (0,146)	-0,850 (0,117)
Poland	-0,788 (0,107)	-1,368 (0,094)	0,066 (0,132)	-2,764 (0,195)
Constant	1,704 (0,0767)	0,435 (0,057)	-1,670 (0,088)	-0,603 (0,058)
Observations	16151	16216	13963	15979
Pseudo R2	0.049	0.030	0.012	0.093
Log pseudo-likelihood	-7652.669	-10700.134	-5350.518	-7965.493

Table 2. Fixed Effect Model 2, use of health care services in European countries. Beta values, standard errors and fit statistics.

MODEL 2	GP	SPECIALIST	HOSPITALISATION	DENTIST
Country Fixed effects				
Sweden	-0,950 (0,109)	-0,775 (0,091)	-0,110 (0,140)	0,324 (0,088)
Netherlands	-0,584 (0,108)	-0,643 (0,083)	-0,431 (0,151)	-0,037 (0,083)
Spain	-0,238 (0,125)	-0,919 (0,093)	-0,496 (0,144)	-1,287 (0,122)
Italy	-0,217 (0,115)	-0,262 (0,083)	-0,384 (0,131)	-0,928 (0,098)
France	0,647 (0,127)	-0,221 (0,082)	-0,093 (0,124)	-1,160 (0,097)
Denmark	-0,017 (0,116)	-1,602 (0,093)	-0,164 (0,137)	0,589 (0,086)
Greece	-1,0205 (0,103)	-0798 (0,083)	-0,855 (0,142)	-1,338 (0,101)
Switzerland	-0,515(0,121)	-0,702 (0,103)	0,049 (0,152)	-0,049 (0,101)
Belgium	0,424 (0,113)	-0,175 (0,080)	0,091 (0,115)	-0,703 (0,083)
Czech Republic	0,286 (0,156)	-0,380 (0,105)	-0,207 (0,159)	-0,687 (0,121)
Poland	-0,987 (0,122)	-1,528 (0,103)	-0,317 (0,147)	-2,487 (0,202)
Income	0,000001 (0,000001)	0,000002 (0,000001)	0,000001 (0,000001)	0,000002 (0,000001)
Years of education Rif. 0-8				
9-13	0,041 (0,057)	0,215 (0,045)	0,078 (0,070)	0,417 (0,056)
14+	0,005 (0,067)	0,463 (0,053)	0,213 (0,082)	0,504 (0,062)
Age	0,014 (0,003)	-0,004 (0,002)	0,009 (0,003)	-0,016 (0,002)
Gender: Female	0,116 (0,045)	0,234 (0,035)	-0,172 (0,055)	0,093 (0,041)
Self-perceived health: Rif. Excellent				
Very good	0,276 (0,074)	0,127 (0,074)	0,075 (0,148)	-0,032 (0,071)
Good	0,384 (0,073)	0304 (0,070)	0,445 (0,137)	-0,129 (0,070)
Fair	0,590 (0,088)	0,660 (0,077)	1,036 (0,142)	-0,319 (0,081)
Poor	1,013 (0,135)	1,139 (0,097)	1,634 (0,156)	-0,611 (0,119)
Chronic diseases	0,844 (0,050)	0,516 (0,046)	0,483 (0,088)	-0,009 (0,051)
Symptoms	0,419 (0,049)	0,490 (0,043)	0,376 (0,079)	-0,135 (0,047)
Smoke	-0,360 (0,049)	-0,254 (0,042)	-0,228 (0,068)	-0,306 (0,05)
Heavy drink	-0,250 (0,087)	-0,240 (0,075)	-0,039 (0,117)	-0,133 (0,090)
Health insurance coverage	0,064 (0,065)	0,098 (0,045)	0,173 (0,081)	0,147 (0,061)
Health insurance coverage (private hospital)	-	-	0,030 (0,070)	
Regular blood pressure checks	0,552 (0,048)	-0,042 (0,048)	-0,087 (0,078)	0,141 (0,055)
Regular blood tests	-	0,317 (0,048)	0,306 (0,079)	0,080 (0,055)
Physical activity	0,173 (0,103)	-0,151 (0,067)	0.383 (0,084)	-0,205 (0,093)
Past period of ill-health	0,188 (0,061)	0,341 (0,043)	0,369 (0,061)	-0,044 (0,053)
Constant	0,117 (0,124)	-1,401 (0,109)	-3,391 (0,183)	-0,893 (0,109)
Observations	16151	16216	13963	15979
Pseudo R2	0.147	0.105	0.10	0.1166
Log pseudo-likelihood	-6860.214	-9961.101	-4874.161	-7757.9
Likelihood-ratio test M1 nested into M2	LR chi2(17) = 1587.27 Prob > chi2 = 0.0000	LR chi2(18) = 1478.07 Prob > chi2 = 0.0000	LR chi2(19) = 52.71 Prob > chi2 = 0.0000	LR chi2(18) = 415.09 Prob > chi2 = 0.0000

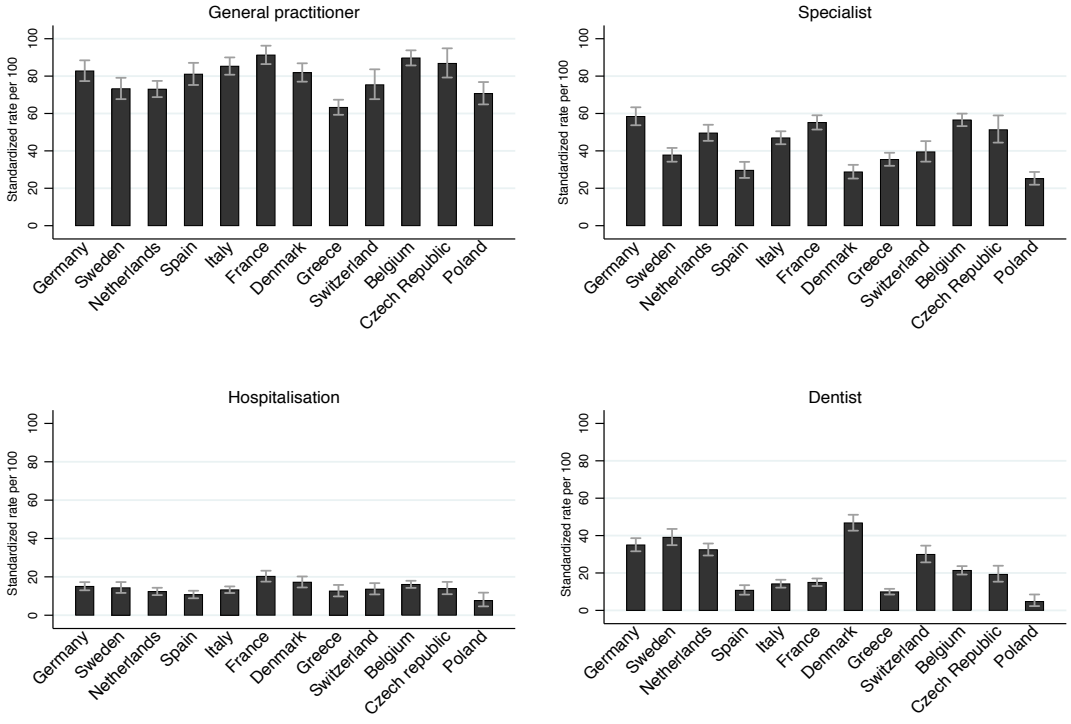
Figures

Figure 1. Individual's self-perceived health and 95% confidence interval adjusted for age by European country



Note: in this analysis the self-perceived health variable was dichotomized: bad health=fair or poor health; good health=excellent, very good or good health; age was codified into four groups: 50-55 years, 56-65 years, 66-75 years, 76 years or more.

Figure 2. Utilisation of health care services and 95% confidence interval adjusted for individual's self-perceived health by European country



Note: Modalities of self-perceived health variable was five: excellent, very good, good, fair and poor. Dependent variables were yes-no dummies.

Figure 3. Fixed Effect Model 3, use of health care services in European countries. Predictive margins and 95% confidence interval of interaction between education and country.

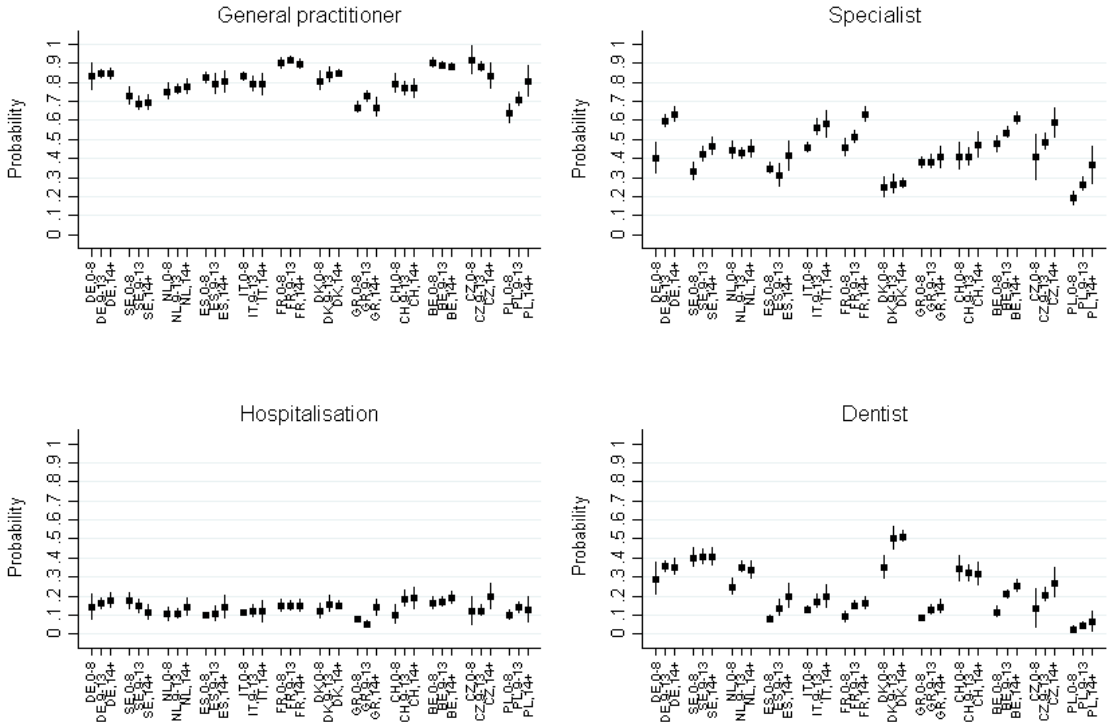


Figure 4. Fixed Effect Model 4, use of health care services in European countries. Average marginal effects and 95% confidence interval of interaction between total expenditure on health as percentage of GDP and education.

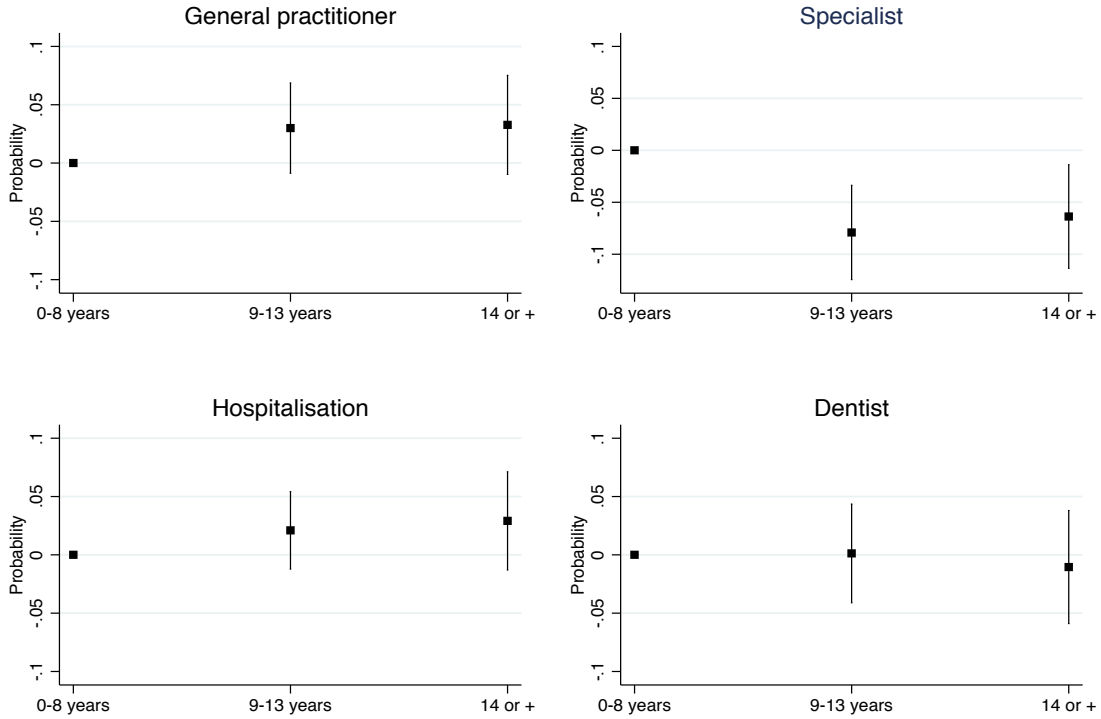


Figure 5. Fixed Effect Model 4, use of health care services in European countries. Average marginal effects and 95% confidence interval of interaction between total hospital beds per 1000 population and education.

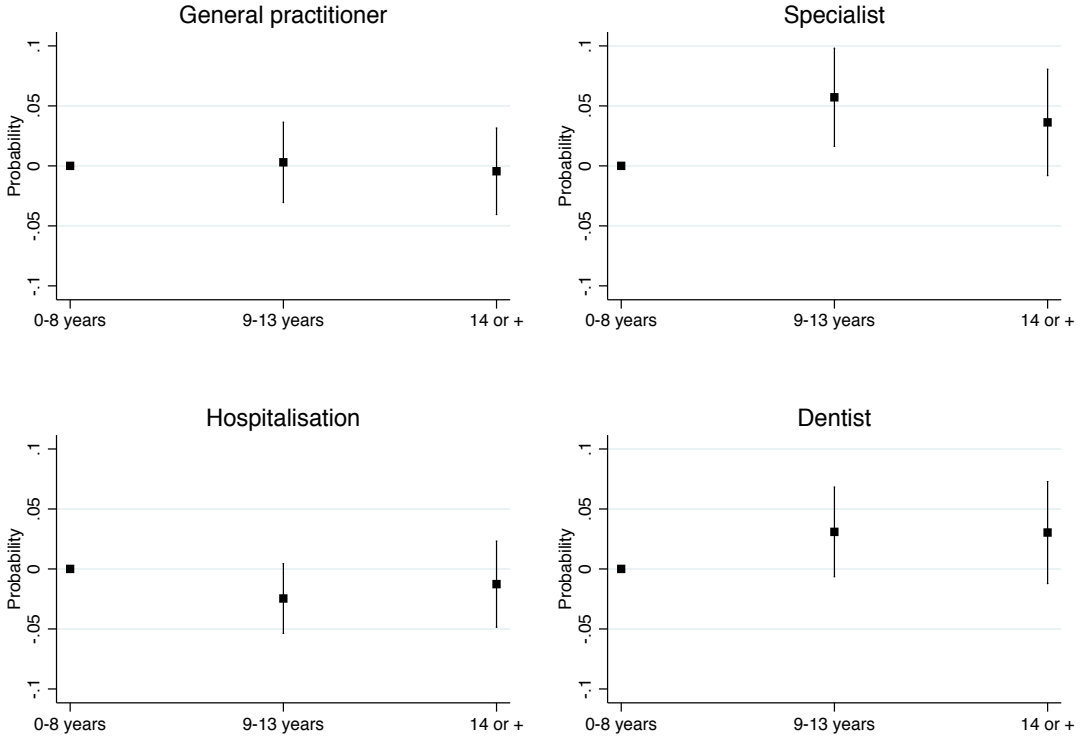


Figure 6. Fixed Effect Model 4, use of health care services in European countries. Average marginal effects and 95% confidence interval of interaction between physicians' density per 1000 population (head counts) and education.

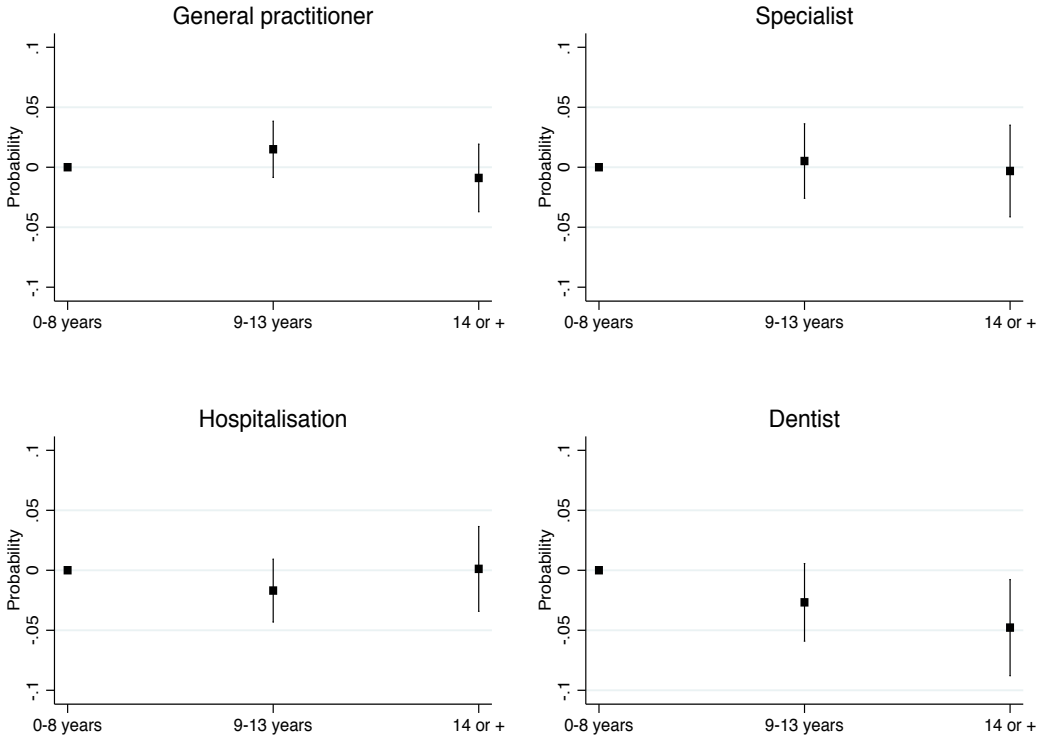
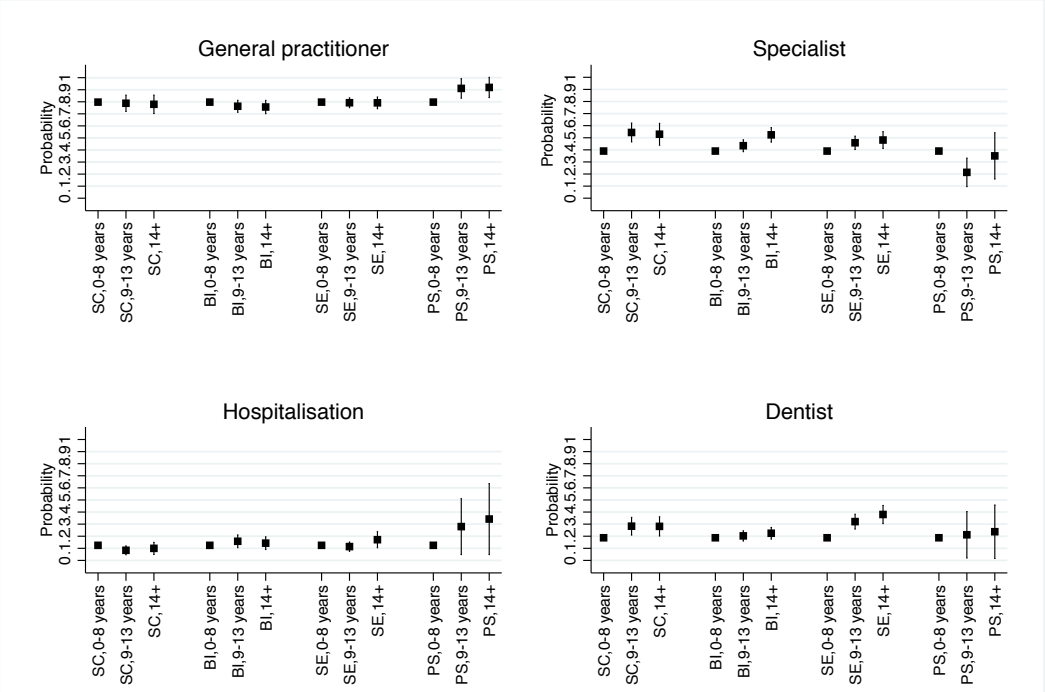


Figure 7. Fixed Effect Model 4, use of health care services in European countries. Predictive margins and 95% confidence interval of interaction between welfare regime and education.



Note: type of welfare regime was SC=Scandinavian; BI=Bismarckian; SE=Southern; PS=Post-socialist