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The Role of Primary Care Physicians in Reducing Health Disparities

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Abstract: Although European healthcare systems have installed universal coverage for their populations, empirical studies repeatedly show inequities in healthcare utilization across socioeconomic groups. One reason is that the socioeconomic status provides crucial resources that can be employed to manage illnesses and therefore patients with higher levels of education and/or income are more effective in navigating the healthcare system. This paper argues that the strength of the primary care system constitutes the central moderating variable for the relationship between educational attainment and access to healthcare.

In strong primary care systems, patients have a regular source of care who coordinates the care process and thereby takes over the central management tasks. In countries with a weak primary care system, coordination and integration of different levels of care have to be carried out by the patient himself. This lack of integration increases the significance of education and thereby creates higher inequalities in access to care. Based on the work by Starfield et al., the strength of the primary care system is assessed by a variety of indicators including the assignment of a primary care function to a particular type of physician, the availability of primary care physicians, referral-based access to specialists. This information is combined with data from the Survey of Health, Aging and Retirement from 2006 on thirteen European countries in order to test the effect of the primary care system on inequalities in utilization and how they translate into health disparities.

The analyses will reveal the role that the primary care system plays for inequalities in access to care. The paper concludes by discussing if strengthening the primary care system e.g. by establishing gatekeeping systems or increasing the availability of primary care physicians is an effective strategy that health policy-makers can adopt in order to reduce health disparities in their countries.

Keywords: health inequalities, healthcare utilization, primary care, education.

1. Introduction

Most individuals and societies attach a high value to health because it ensures well-being and participation in social life. Since health is seen as a basic prerequisite for a good life, most industrialized countries proclaim that it should be equally distributed (Council of the European Union 2001; Hanratty, Zhang and Whitehead 2007). However, vast evidence documents that persons with a higher socioeconomic status have consistently better health outcomes. In fact, while the level of population health has been improving over the last decades, health inequalities have increased (Cutler and Lleras-Muney 2006; Mirowsky and Ross 2008; Robert and House 2000).

Explanations of health inequalities have focused both on individual factors such as lifestyle, stress, etc. and societal factors like income inequality. The impact of the healthcare system on the creation of inequalities has been considered limited because differences in health can occur before persons even enter the system (Mirowsky, Ross and Reynolds 2000; Wilkinson 1999). This argument neglects that healthcare systems have the potential for reproducing or reducing inequalities over the course of disease which is particularly relevant for persons with chronic conditions. While many studies have shown that inequalities in access and utilization of care exist, empirical evidence which assesses if these translate into inequalities in health outcomes is scarce. This paper examines the relationship between healthcare systems and inequalities in health. I argue that inequalities in access and quality of care produce a differential course of disease between socioeconomic groups. These effects of differential healthcare utilization are moderated by the institutional structure of the healthcare system which can reduce but also increase the inequalities created outside of the system.

The effect of the healthcare system depends on its institutional setup (Olafsdottir and Beckfield 2009), in particular, whether it is oriented towards reducing inequalities in health or towards marketization and individual responsibility in which persons lacking crucial resources receive less adequate care. Thus, I propose to add healthcare system features to the explanation of cross-national variation in health inequalities (Olafsdottir and Beckfield 2009). This paper argues that the strength of the primary care system constitutes the central moderating variable for the relationship between educational attainment and access to healthcare.

In strong primary care systems, patients have a regular source of care who coordinates the care process and thereby takes over the central management tasks. In countries with a weak primary care system, coordination and integration of different levels of care have to be carried

out by the patient himself. This lack of integration increases the significance of education and thereby creates higher inequalities in access to care.

In order to investigate the effect of healthcare system structures on inequalities in health, is guided by the following questions: *Why do health inequalities differ across health systems? Which systems produce a relatively equal course of diseases of persons with different educational attainment?*

In the next section, I define health inequalities and present the main theoretical approaches for explaining them. In section 3, I focus on the context effects of the healthcare system and discuss the different primary care orientations in European countries. In section 4, the used data and methods are described before section 5 presents the results of the multivariate analyses. The final section concludes with a discussion of the role the primary care system can play in policy-makers attempts for reducing inequalities in health.

2. Health Inequalities

Following the International Society for Equity[1] in Health, I define inequalities in health as "systematic and potentially remediable differences in one or more aspects of health across populations or population groups defined socially, economically, demographically, or geographically" [2]. In line with this definition we find differences in health between many social groups defined by gender, race, ethnicity, nationality, etc. My usage of health inequalities refers primarily to differences between educational groups.

Inequalities in health between socioeconomic groups are a ubiquitous phenomenon since they can be found for almost all diseases, in industrialized as well as developing countries, nowadays and even historically for diseases which no longer exist today. While the existence of health inequalities has been documented in numerous studies, theoretical explanations connecting socioeconomic status and health have so far not been conclusive (Cutler and Lleras-Muney 2006). However, scholars agree that inequalities in health persist over the whole range of socioeconomic status variables and therefore refer to more general mechanisms than an impoverished living situation or hazardous work of low status persons. A higher level of education for instance is beneficial to health even beyond high school completion (Cutler and Lleras-Muney 2006). Income improves health past the point at which basic material needs are satisfied and health care can be afforded (Schnittker 2004) and even small differences in occupational categories (within the British civil service) are associated with a differential health status (Marmot et al. 1991).

Most studies assume a causal impact of socioeconomic status differences on inequalities in health. Data from natural quasi-experiments support this reasoning by showing that the educational expansion in the 20th century in Western countries is associated with lower mortality rates later in life (Arendt 2005; Lleras-Muney 2005). However, the mechanisms through which socioeconomic status and health status are connected are very complex. The reason is that health and illness have a biological quality since they occur within a person's body while socioeconomic status is a social phenomenon (Krieger 2004). Consequently, explanatory fac-

[1] In the discussion about differences in health or healthcare utilization, the terms "inequality/equality" and "inequity/equity" are often used interchangeably. While both terms have to some extent negative connotations, inequity has a much stronger normative quality that in my opinion is not useful for a scientific investigation of this topic. Thus, in the following I will exclusively refer to *inequalities* in health or healthcare utilization. However, verbal citations that I use may refer to inequity.

[2] See: http://www.iseqh.org/workdef_en.htm [accessed: 13.05.2009].

tors put forward for explaining *how* and *why* the socioeconomic status affects health need to fulfill two basic requirements:

(1) In order to bridge the gap between social determinants and health, theoretical approaches need to point to physiological processes which can explain the "embodiment" (Krieger 2004) of social characteristics (*downstream focus*).

(2) Moreover, theoretical mechanisms need to specify through which societal structures and processes the respective explanatory factor is distributed by socioeconomic position (*upstream focus*).

These considerations demonstrate that in order to account for health inequalities we need a multilevel framework because both biological and societal processes are involved. In the following, I present the dominant theoretical frameworks used for explaining health inequalities which usually have focused either on downstream or upstream mechanisms (Krieger 2001)[3].

2.1 Downstream Explanations

Risk Factors or Health Behavior: Risk factors and health behaviors have played a major role in explaining the embodiment of socio-economic status. The reason is that behavioral patterns which can protect health or increase the risk of illness such as smoking (Gruer et al. 2009) are much more prevalent among low status groups. Cutler and Lleras-Muney (2006) for instance show that the better educated are less likely to smoke, to drink a lot, to be overweight or to use illegal drugs (risk factors). They are also more likely to exercise and use preventive health services (health behaviors). Even though health behaviors and risk factors explain some of the socioeconomic disparities in health, a substantial inequality remains after controlling for those factors.

Stress-Hierarchy: The psychosocial theory of health assumes that health inequalities can also be created through higher stress levels of persons with a low socioeconomic status. Stress levels affect neuroendocrine reactions within the body which are assumed to increase the general susceptibility to disease (Cassel 1974). Thus, stress does not foster the occurrence of a specific disease but increases the risk for morbidity in general. This view is consistent with

[3] Krieger proposes the ecosocial theory of health as a „dynamic multilevel model" which connects both the psychosocial theory of health and the political economy of health. However, existing work on the ecosocial theory does not go beyond the declaration of the intent to connect both levels without specifying the respective theoretical mechanisms.

the empirical fact that health inequalities exist for almost all diseases and health problems (Cassel 1974). It is important to note that stress does not automatically arise from stressful conditions or strain but also depends on a person's ability to cope with the situation. Persons with a lower socioeconomic status have not only a higher risk of situational stressors (e.g. low autonomy in the workplace, higher risk of unemployment, etc.) (Marmot et al. 1991), they also have fewer resources in order to cope with the stressful situation (e.g. lower sense of personal control, lack of social support) (Mirowsky and Ross 1998).

Social Support: Social networks and social support constitute another factor that contributes to the explanation of socioeconomic differences in health. Vast evidence shows that social networks are beneficial to a person's health and this holds true among a wide range of diseases. Social support influences both the initial occurrence of health problems and the probability of recovery and survival (Berkman, Leosummers and Horwitz 1992; Berkman and Syme 1979). In a review on the influence of social networks, Uchino et al. (1996) show that social support has beneficial effects on the cardiovascular, endocrine and immune systems. Since persons with a lower socioeconomic status have a higher risk of social isolation and lack social support more often, they show higher rates of morbidity and mortality (Cattell 2001). While the relationship between social support and health has been firmly established the mechanisms through which the relationship operates are not yet well-defined. Some scholars argued that social networks could influence health through the encouragement of healthy behaviors or personality traits. However, studies controlling for these factors show that this explains only a minor part of the social network influence. Stress-buffering effects have been found in some studies but overall the effect is not consistent (Uchino, Cacioppo and KiecoltGlaser 1996).

Downstream explanations focus on the biological responses of correlates of socioeconomic status variables. Health behaviors, stress and social support have been found to play important roles in the explanation of socioeconomic inequalities in health. These findings suggest that appropriate policy responses to inequalities in health could be health education programs which increase healthy behavior in low status groups or decrease risk factors or intervention programs that increase social support and coping resources with stressful living conditions. Thus the main message that policy-makers can take from these theoretical approaches is that we need targeted interventions for low status groups in order to increase their resources and decrease their risks for disease. The critique that has arisen towards this perspective is that it focuses almost exclusively on the individual and his or her risks and resources. However, it

neglects the importance of social structures and public policy for the social distribution of the relevant risk factors and resources.

2.2 Upstream Explanations

Upstream explanations of health inequalities focus on the societal influence on health by raising the question why certain mediators, e.g. health behaviors are not equally distributed across population groups. These explanations developed out of a Marxist tradition as a reaction against the risk factor epidemiology of health inequalities which holds the individual and his lack of health behavior accountable for the existence of health inequalities. They argue that we should focus not so much on individual behavior but on the structural barriers to health created by economic and political institutions (Krieger 2001; Krieger 2004).

Political Economy of Health Inequalities: Studies on the political economy of health inequalities look on inequalities from an aggregate level through the comparison of communities or whole societies. They raise the question why some societies create higher inequalities than others and which institutional or cultural factors account for the level of inequality. One factor that has been put forward to explain differences in health across societies is *income inequality*. Several studies have shown that societies or communities with higher levels of income inequality show lower levels of average health (Kawachi and Kennedy 1997; Kawachi et al. 1997; Wilkinson and Pickett 2006). The theoretical argument is that these communities or societies have a lack of social capital or social cohesion which has detrimental effects on health. However, the evidence on the effect of income inequality on health is mixed and it also remains to be seen if income inequality affects not also variation in health inequalities across societies. Second, within the last two decades an interest evolved in the cross-national differences in health inequalities. In their forthcoming review, Beckfield and Krieger (2009) argue that four features of the political system have been used for explaining the cross-national variation in health inequalities: (1) the transition to a capitalist economy, (2) neoliberal restructuring, (3) welfare states (including features of the health system), (4) political incorporation (Beckfield and Krieger 2009). The transition to capitalism and neo-liberalism show a consistent negative effect on health inequalities, political incorporation on the other hand decreases inequalities in health. The influence of the welfare state does not provide a clear picture with some studies supporting a reduction of health inequalities by an extended welfare state or healthcare system while others report no differences or even an increase in inequalities.

Fundamental Cause Explanation: Link and Phelan (2000) develop an alternative perspective – the fundamental cause approach – which highlights the role of structural barriers to equality in health. They start out from the empirical observation that health inequalities are rampant and persist even though historically certain diseases have died out and others evolved. As a consequence, they argue that we have to conceptualize the association between socioeconomic status and health as a dynamic not as a static relationship. A high socioeconomic status provides persons with certain resources such as knowledge, money and self-efficacy which they can invest and employ in order to increase their health. They argue that these resources make risk-factor based interventions ineffective for reducing inequalities: if more information about risk-factors is given or if new treatments are available, those with a high socioeconomic status will benefit the most. As a consequence, they argue that a focus on risk factors or stress can never fully explain health inequalities because socioeconomic status is a fundamental cause of health mediated through mechanisms which change over time. Thus, the only solution for a reduction of health inequalities is the reduction of social inequalities themselves.

Upstream explanations of health inequalities demonstrate that it is societal structures and the existence of social inequalities in general that cause social disparities in health. Thus, the policy implication of the upstream approaches to health inequalities is much more fundamental because it argues that the main strategy that can effectively reduce inequalities in health is to reduce social inequalities in general. Starfield (2006: 14), for instance, claims that "achieving equity in health is ultimately a political process based on a commitment to social justice rather than to survival of the fittest." Particularly the expansion of higher education and public funding for these programs has been proposed as an adequate policy for reducing health inequalities (Cutler and Lleras-Muney 2006; Mirowsky, Ross and Reynolds 2000). The conclusion that reducing social inequality diminishes social disparities in health is valid but it entails a fundamental and therefore rather unlikely policy option. Furthermore, it overlooks that targeted intervention for subordinate groups can be very effective in improving their health despite the "fundamental cause" nature of social status (Krieger 2001). As a consequence, even though eliminating social disparities in general might be more effective, we should not neglect the potential benefit that can result from a specific focus on risk and resources-based interventions.

In the next section, I discuss the role of medical care for the (re-)production of health inequalities. This explanatory factor entails both a downstream and an upstream perspective. In order to demonstrate an effect of healthcare utilization on health inequalities one needs to show that healthcare affects a person's (embodied) health status (healthcare – body) and we need to ex-

plain why healthcare is more beneficial to persons with a high socioeconomic status (society/healthcare system – healthcare).

3. Primary Care Systems

"Concerns about equity in health are societal concerns and need to be dealt with by a focus on how societal influences and their interactions can improve the health of the relatively disadvantaged to levels attained by the more advantaged." (Starfield 2007: 1360)

Health can be conceptualized as a form of "capital" which produces quality of life and can be increased by investment (Grossman 1972). Since research on stratification is interested "in systematic differences in opportunities and quality of life" (Ross and Bird 1994: 161), differences in health can be conceived as a form of social stratification in addition to the conventionally assessed differences in income, education and social prestige (Olafsdottir and Beckfield 2009). Social stratification systems are determined by the institutional structure of societies. Hence, social disparities in health are also not only a result of individual qualities or interpersonal relations but primarily of societal factors and institutional structures.

Accordingly, the role education plays for access to and effectiveness of healthcare does not have universal character but instead varies with the institutional context of the healthcare system. One indicator for the relevance of institutional structures in the production of health inequalities is that we find substantial cross-national and cross-regional variation in the degree of health inequalities (Beckfield and Krieger 2009; Beckfield and Olafsdottir 2008). Consequently, institutional features of the healthcare system can constitute important variables for the explanation of the cross-national variation in health inequalities (Starfield 2007).

The question is then which features of the healthcare system have an impact on inequalities in health. One important characteristic of health systems that has been argued to decrease inequalities in health is the strength of primary care systems (Ferrer, Hambidge and Maly 2005). Primary care plays an important role in the healthcare system because it is the general practitioner or family physician who coordinates different treatments and integrates social background information in the diagnostic process (Boerma and Dubois 2006). Due to the rapidly increasing specialization of medical care the need for someone to pull the strings in the fragmented diagnostic and treatment process has increased (Franks, Clancy and Nutting 1992). The family physician who has a long-standing relationship with the patient, knows his or her illness history and his or her social background, is often in the best position to make a treatment decision by not only following medical rationales but taking the life situation of the patient into account.

Since persons with a higher level of education are in a better position to seek adequate healthcare and to navigate a complex healthcare system, this supporting function of the general practitioner is particularly important for persons with a low level of education. In strong primary care systems, patients have a regular source of care who coordinates the care process and thereby takes over the central management tasks. This is particularly important for individuals with a low level of education or health literacy because these persons lack information for assessing their symptoms and selecting an adequate specialist (Pihl, Erlinghagen and Ott 2005). In countries with a weak primary care system, coordination and integration of different levels of care have to be carried out by the patient himself. This lack of integration increases the significance of education and thereby creates higher inequalities in access to care.

In general, the relationship between primary care and health inequalities can be conceptualized as a structure-process-outcome model (Patrick 1997):

Structure	=	Institutional structures (macro-level)
Process	=	Delivered Services (micro-level)
Outcome	=	Differences between educational groups (micro-/macro-level)

The institutional *structures* on the macro-level constitute different opportunities and constraints for persons with different levels of education. These opportunities and constraints create different *processes* of service utilization which affect an individual's health status. Group differences between educational groups within and across countries constitute the *outcome* of interest.

Accordingly, I *hypothesize that countries with a stronger primary care orientation show lower levels of inequality in healthcare utilization (process) and in health (outcome).*

Several studies have found a relationship between a strong primary care orientation and a low level of health inequality (see Starfield, Shi and Macinko 2005, for a review) on the one hand and a low inequality in healthcare utilization on the other hand (Reibling and Wendt 2009). Nevertheless, the relationships found indicate some country outliers. Hence, Starfield (2002: 209) suggests to additionally control for health expenditures since "it is possible that underspending accounts for suboptimal performance later in life in the countries with the best primary care systems". Therefore, I present in the following not only institutional indicators on gatekeeping and information on the density of general practitioners (GPs but also information on public spending levels in European comparison.

Several previous studies have shown that there are major differences in the strength of primary care across European healthcare systems (Gervas, Fernandez and Starfield 1994). Particularly, the strength of gatekeeping differs across countries.

Gatekeeping or family doctor systems are institutional regulations that structure patients' entry and passage through the system. The gatekeeper reflects "a defined port of entry" (Gervas, Fernandez et al., 1994: 311), usually the GP, who navigates the patient through the healthcare system (Calnan, Hutten et al., 2006). Thereby he or she controls the access to secondary care through the referral system with the aim to reduce unnecessary use of expensive specialist care (Pihl, Erlinghagen et al., 2005). In most studies, gatekeeping is measured as a dichotomous variable. Based on Wasem and colleagues (2003), I argue that gatekeeping consists of several characteristics. The four indicators presented in table 1 show that gatekeeping can be established to different degrees.

The first component "registration with a GP" captures whether people are forced to set their choice of GP (for a certain period of time) who coordinates their care and regulates the access to specialists. This indicator is one of the constitutive elements of "gatekeeping" which has been widely used in previous studies for assessing access regulations (e.g. Gervas, Fernandez et al., 1994; Ettelt, Nolte et al., 2006). Ettelt et al. (2006) demonstrate that the restrictiveness of GP registration increases when the GP can only be selected in a predefined geographical area. As shown in table 3, countries which do not have a GP registration also do not restrict the area of choice. The combination of GP registration and limitation of geographical area is found for example in Denmark, Italy, and Spain, while in the Netherlands, Poland and Sweden the choice of a GP is geographically unrestricted.

The next indicator refers to the remuneration of the GPs. Wasem and colleagues (2003) argue that payment by capitation is an essential prerequisite of a functioning gatekeeping system. Under capitation schemes, doctors receive a fixed amount for each patient on their list independently of services provided. The idea is that this flat-rate "motivates doctors to practice in a way that encourages patients to join their list" (Or, 2000: 16).

The last indicator refers to the control of access to the secondary care market (Scott, 2000) which includes specialists in private practices and specialists working in hospital outpatient departments. The most restrictive way of regulation is that patients need a referral in order to access secondary care. In this case, there are no legal alternatives to see a specialist without a referral or paying the whole fee out-of-pocket. In some countries, people can use a referral but also skip the referral system by accepting a higher co-payment (Ettelt, Nolte et al., 2006). This "skip & pay" procedure is established in Austria, Belgium, France, Germany, and Sweden. While in Austria and Germany the specialist visit is free when referred, in France, Sweden and Belgium a higher than the regular co-payment is charged when people skip the referral

system. In Sweden for example people pay 24 € for a specialist visit without a referral but only 13 € when being referred. The least restrictive pole on this indicator is represented by the Czech Republic, Greece and Switzerland where people have free (not-referral based) access to specialist care.

Table 1: Gatekeeping in international comparison (status 2005)

Country	*GP Registration*	*Geographic Restriction*	*GPs paid by capitation*	*Access to specialist*	*Gatekeeping Index*
Austria	--	--	+	skip & pay	2
Belgium	--	--	--	skip & pay	1
Czech Republic	+	--	+	free	2
Denmark	+	+	+	referral	5
France	--	--	--	skip & pay	1
Germany	--	--	--	skip & pay	1
Greece	+	--	--	free	1
Italy	+	+	+	referral	5
Netherlands	+	--	+	referral	4
Poland	+	--	+	referral	4
Spain	+	+	--	referral	4
Sweden	+	--	--	skip & pay	2
Switzerland	--	--	--	free	0

Source: MISSOC-INFO 03/2002, MISSOC Tables 2003, WHO country reports (see http://www.euro.who.int/countryinformation).

The primary care orientation of a country is not only determined by the institutional regulations of gatekeeping but also by the number of GPs available. Table 2 illustrates the number of GPs per 1000 population in thirteen European countries[4]. A high GP density can be found in Belgium, France, Germany, and Austria – all countries with only weak gatekeeping features. This high GP density in these countries is a result of a high percentage of general practitioners of the overall number of physicians (44%-53%). The strong gatekeeeping countries Denmark, Netherlands, Italy, Spain, and Poland have instead a much lower number of GPs per 1000 population. The lowest densities can be found in Poland and Greece (0.1 and 0.3). In Greece this is due to the fact that general practice has only recently been introduced as a medical specialty (Davaki and Mossialos 2006). This shows that the institutional gatekeeping regulations do only rarely coincide with a high density of GPs.

[4] Country selection based on availability in survey data (see section 4).

Public expenditure per capita is used as a control variable. Austria, Denmark, France, and Germany are the countries with the highest expenditure per capita. Poland has an outlier position with only half of the amount of the next highest countries Greece, and the Czech Republic. Overall, it is the Southern and Eastern European countries which have the lowest spending levels.

Table 2: Physician density and expenditure in international comparison (2005)

Country	*Number of Physicians per 1000 population*	*Number of GPs per 1000 population*	*Percent of GPs*	*Public Expenditure per Capita in PPP*
Austria	3.4	1.5	44%	2644
Belgium	4.0	2.1	53%	1528
Czech Republic	3.5	0.7	20%	1289
Denmark	2.9	0.8	28%	2639
France	3.4	1.7	50%	2618
Germany	3.4	1.5	44%	2577
Greece	4.8	0.3	6%	1414
Italy	4.1	1.0	24%	1933
Netherlands	3.5	0.5	14%	1769
Poland	2.4	0.1	4%	594
Spain	3.2	0.9	28%	1600
Sweden	3.4	0.6	18%	2415
Switzerland	3.7	0.5	14%	2388

Source: OECD Health Data 2009.

4. Data and Methods

Data

My analyses use the 2006 wave of the Survey of Health, Ageing, and Retirement[5], a cross-national panel study on health, socio-economic status and social networks of individuals aged 50 or over. The second wave was conducted through face-to-face interviews in thirteen European countries including Austria, Belgium, Czech Republic, Denmark, France, Germany, Greece, Italy, the Netherlands, Poland, Spain, Sweden, and Switzerland. For the analyses all individuals with missing values on one of the analyses variables were dropped. This leads to a sample size of 30823 respondents (see table 3 for sample sizes per country).

Table 3: Sample sizes by country

Country	Number of Observations
Austria	1256
Belgium	2954
Czech Republic	2595
Denmark	2394
France	2690
Germany	2429
Greece	2972
Italy	2854
Netherlands	2472
Poland	2340
Spain	1952
Sweden	2554
Switzerland	1361
Total	30823

[5] This paper uses data from SHARE Waves 1 & 2, as of December 2008. SHARE data collection in 2004-2007 was primarily funded by the European Commission through its 5th and 6th framework programmes (project numbers QLK6-CT-2001- 00360; RII-CT- 2006-062193; CIT5-CT-2005-028857). Additional funding by the US National Institute on Aging (grant numbers U01 AG09740-13S2; P01 AG005842; P01 AG08291; P30 AG12815; Y1-AG-4553-01; OGHA 04-064; R21 AG025169) as well as by various national sources is gratefully acknowledged (see http://www.share-project.org for a full list of funding institutions).

For investigating inequalities in health and health care utilization, different variables are used. As health measures four objective health indicators are chosen (see table 5): the number of chronic illnesses, the number of functional limitations, the number of restrictions in activities of daily living and the number of restrictions in instrumental activities of daily living. These measures capture adequately the health status and the health-related quality of life of older persons. As measures of healthcare utilization, the number of all doctor visits, and the probability of any specialist visit in the last 12 months are selected.

The independent variable of interest is the respondent's level of education. This is assessed by the highest educational degree attained based on the International Standard Classification of Educational Degrees (ISCED-97) . This classification distinguishes seven levels of education which were reclassified in three categories: „high", „medium", and „low" education. „Low education" refers to ISCED classes 0,1, and 2 (pre-primary, primary and lower secondary education) representing the reference category in the analyses. „Medium education" refers to classes 3 and 4 (upper and post-secondary but not tertiary education) and „high education" is constituted by persons in groups 5 and 6 (tertiary education). As control variables I include the gender and age of the respondent. Furthermore, I assess the living situation of a person by controlling for employment status (employed/self-employed versus retired, sick or disabled, etc.) and whether one lives with a partner or spouse. Finally, I include two indicators for risk factors or health behaviors: obesity measured by the body mass index and current smoking status.

Table 4: Description of the variables used in the analyses

Variable	*Description*
Dependent Variables	
chronic	Number of chronic diseases
fl	Number of functional limitations
adl	Difficulties with activities of daily living
iadl	Difficulties with instrumental activities of daily living
alldocv	Number of medical doctor visits in the last 12 months
spdocvd	Did have specialist visits in the last 12 months?
Independent Variables	
male	Gender: male=1; female=0.
age	Age in years
isced0t2 (reference)	Education, ISCED classes 0-2; otherwise = 0.
isced3a4	Education, ISCED classes 3-4=1; otherwise = 0.
isced5a6	Education, ISCED classes 5-6=1; otherwise = 0.
employed	Employed or self-employed = 1; otherwise = 0.
livtog	Living with spouse/partner = 1; living as single = 0.
obese	Body mass index over 25 = 1; 25 or less = 0.
cursmok	Respondent is current smoker = 1, otherwise = 0.

Methods

I employ negative binomial regression for all health measures and the number of doctor visits; for the occurrence of specialist visits a binary logistic regression is estimated. In the analysis, I estimate regressions of health/healthcare utilization measures on the covariate of interest education, in addition to the controls, for each country separately. Covariates are introduced hierarchically in order to assess if the effect of education on health and healthcare utilization is sensitive to gender, age, the living situation and personal risk factors.

For the interpretation of the education effect odds ratios are displayed. I focus on the effect of high education versus low education. As a result values below 1 indicate inequality disfavoring individuals with lower education, values above 1 show favorable results (better health/ more doctor visits) for the less educated.

5. Results

Figure 1: Mean difference between individuals with high versus low education

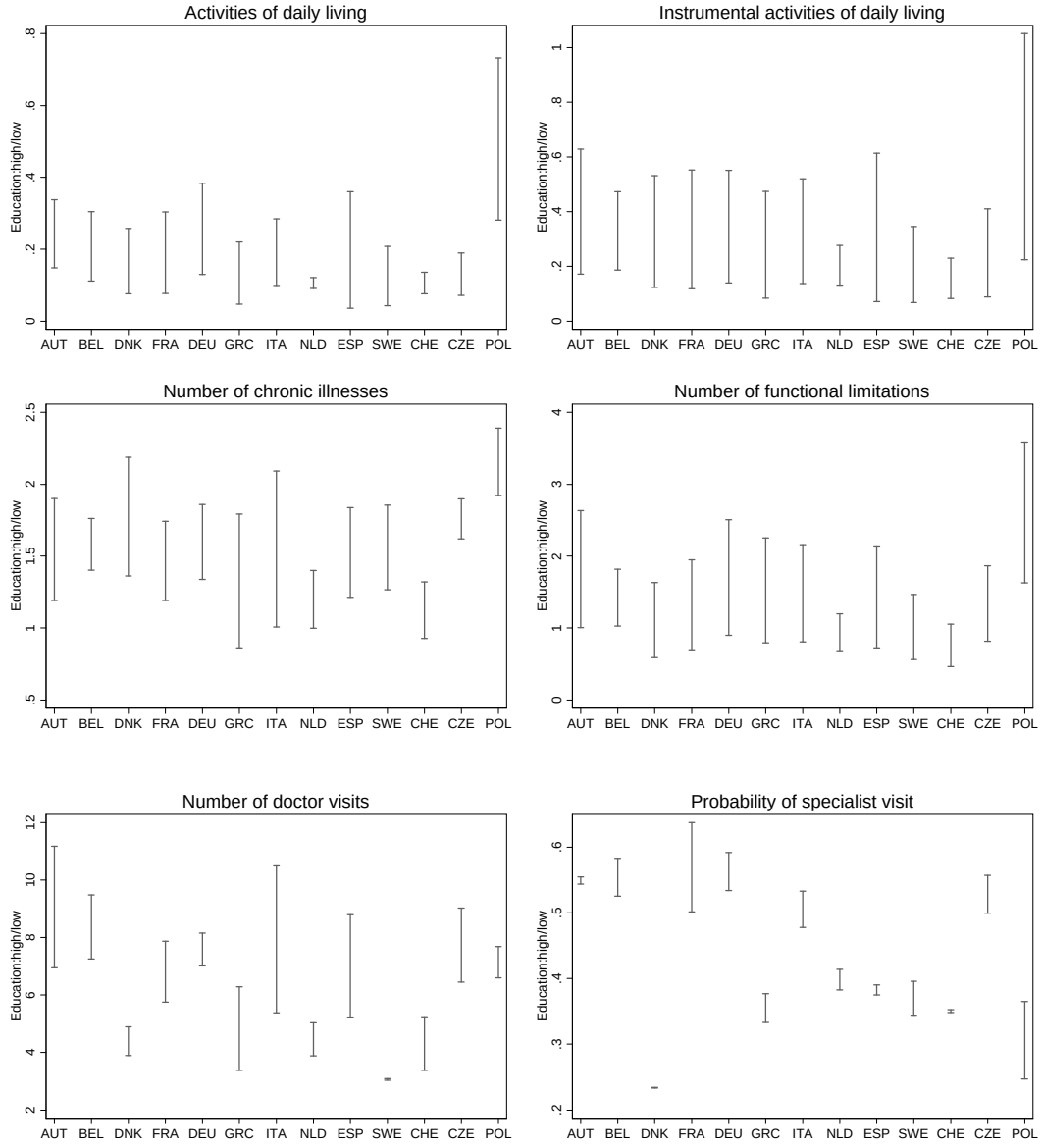


Figure 2 reports the mean difference between individuals with high and low levels of education for different health and healthcare utilization measures. The comparison of mean differences gives a first indication for existing country differences in health inequalities. However, the scales of the variables differ so that one should not compare the size of the education difference but just the degree of country variation across these measures. One can see notable differences between educational groups on all health and healthcare measures.

For the quality of life measures (functional limitations, restricted activities of daily living, restricted instrumental activities of daily living) we find high differences between less and

higher educated persons in Poland, Spain, and Germany and relatively small differences in the Netherlands, and Switzerland. For the number of chronic illnesses, high levels of inequality exist in Denmark, Greece, and Italy and low inequality in the Czech Republic, Netherlands, Belgium, and Switzerland.

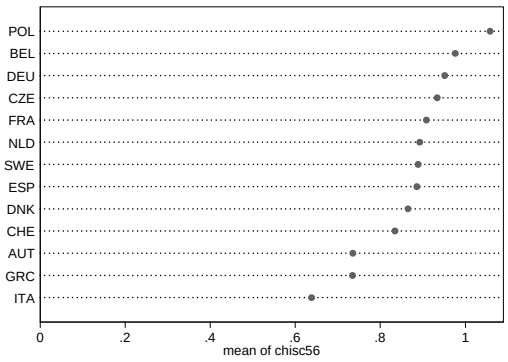
For the healthcare utilization measures we find high inequality in the number of physician visits in Italy, Austria, and Spain, and small differences between educational groups in Sweden, Germany, and Denmark. Inequality in the probability of a specialist visit is high in France and Poland, and low in Denmark, Switzerland, and Austria.

In general, individuals with a low level of education show a higher number of chronic illnesses and limitations and thus a less favorable health status and quality of life than individuals with a high level of education. In terms of doctor visits, the inequalities differ between GP and specialist visits. The less educated have in most countries more visits to a general practitioner but their probability of having a specialist visit is consistently lower than the probability of the high educated. These results are in line with earlier findings reporting a disfavorable distribution of health measures and specialist visits for the less educated and a favorable distribution of GP visits (Reibling and Wendt 2008; van Doorslaer, Masseria and Koolman 2006).

The comparison of inequalities across countries does not reveal a clear pattern since the ranking of countries in terms of the level of inequality differs considerably across health and utilization measures. In general, Poland and the Southern European countries are more often characterized by inequality levels than other countries. Denmark shows comparatively high health inequalities but low inequalities in healthcare utilization. Switzerland and the Netherlands show particularly low levels of health inequality.

However, the descriptive comparison of group means does not account for differences in the age or gender distribution across countries. Therefore, in the next step inequalities are assessed under control of different covariates. By introducing the covariates hierarchically, their impact on the education effect can be assessed. This country-wise-hierarchical regression procedure produces many individual regressions that are made available upon request. The results are illustrated in the following through figures which represent the odds ratios.

Number of chronic conditions

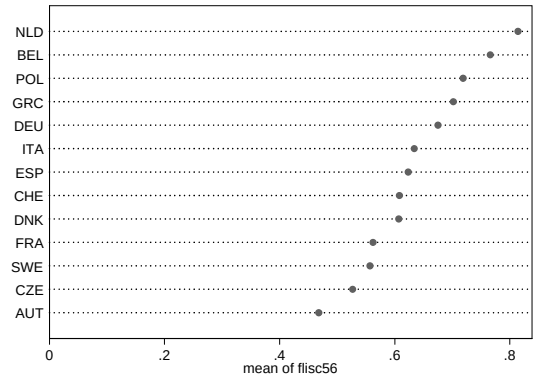


In a bivariate regression of education on the number of chronic illnesses, all countries show significant differences. Controlling for age and gender eliminates the education effect in Poland and the Czech Republic. The education effect in Germany, Belgium, and Switzerland can be explained by the respondent's employment status.

Figure 1: Odds Ratio of High versus Low Education on the number of chronic illnesses (full model)

Risk factors (obesity and smoking) reduce the size of the education effect in all countries but even in the full model significant inequalities remain in Austria, Denmark, France, Greece, Italy, the Netherlands, Sweden, and Switzerland (see figure 1).

Number of functional limitations

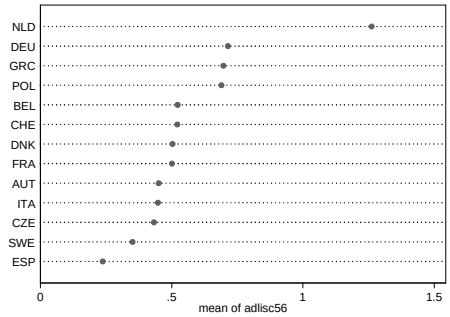


Inequalities in the number of functional limitations are much more robust than for the number of chronic conditions. Even in the full model under control of all covariates, significant education effects remain for all countries. Individuals with a low level of education have in all countries a higher number of functional limitations.

Figure 2: Odds Ratio of High versus Low Education on the number of functional limitations (full model)

The lowest inequalities are found in the Netherlands, Belgium, and Poland, while Austria, the Czech Republic, and Sweden show the highest levels of inequality (see figure 2).

Number of restricted activities of daily living

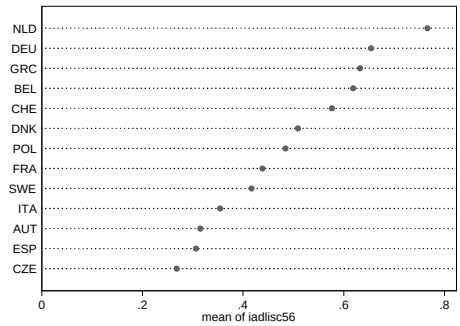


A major explanatory factor is age since it substantially reduces or even eliminates the effect of education in several countries. Under control of all covariates, significant education differences can still be found in all countries except Germany, Greece, and the Netherlands.

Figure 3: Odds Ratio of High versus Low Education on the number of restricted activities of daily living (full model)

The effect is highest in Spain, Sweden, and the Czech Republic and smallest in the Belgium, Poland, and Switzerland.

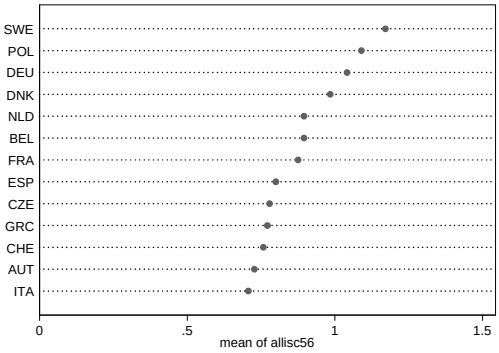
Number of restricted instrumental activities of daily living



The pattern looks similar for the number of instrumental activities of daily living. The largest differences exist in the Czech Republic, Spain, and Austria and the smallest in the Netherlands, Germany, and Greece.

Figure 4: Odds Ratio of High versus Low Education on the number of restricted instrumental activities of daily living (full model)

Number of all medical doctor visits

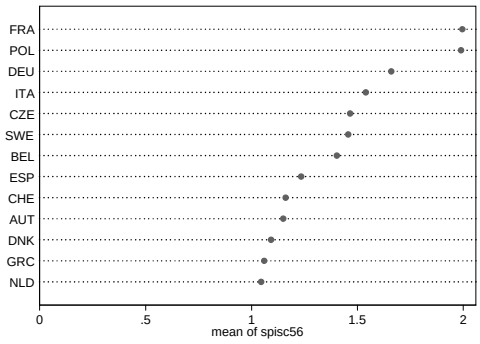


For the number of all medical doctor visits, we find a significantly lower number of visits for the higher educated in all countries but Poland, and Sweden. However, controlling for social statistics, living situation, and the number of chronic illnesses substantially reduces the effect.

Figure 5: Odds Ratio of High versus Low Education on the number of all doctor visits (full model)

In Denmark and Sweden, we even find a reversed effect of a higher number of medical doctor visits for the better educated.

Probability of any specialist visit

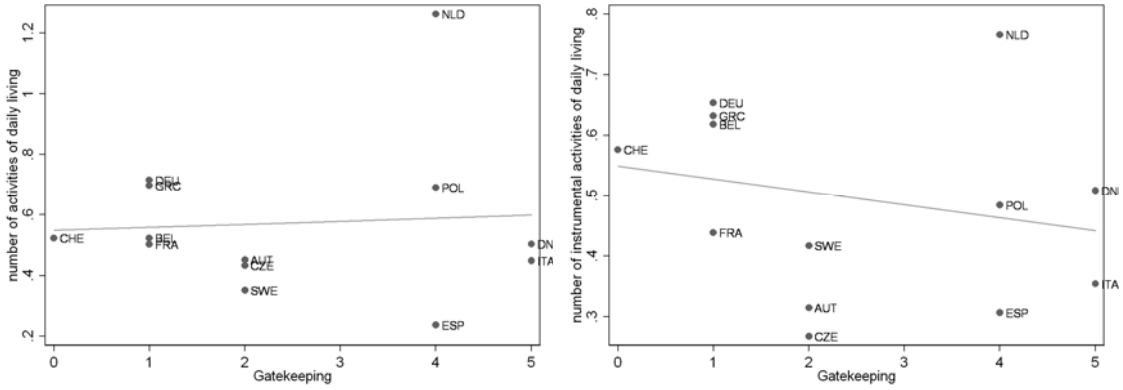


However, the probability of having any specialist visits differs. Here, we find a significantly higher probability of specialist visits for individuals with a high level of education in all countries except for Denmark, the Netherlands, and Switzerland. The effect is particularly high in France, Italy, and Poland.

Figure 6: Odds Ratio of High versus Low Education on the probability of any specialist visit (full model)

This shows that the descriptive patterns do not hold under the control of individual characteristics. While some countries initially start out with a high level of inequality, this can be explained by individual-level variables, e.g. age and risk factors. However, in most cases the effect of education remains robust and we still find variation in the level of inequality across countries.

In the next step, the aim was to explain that country variation by health system characteristics – more specifically the primary care orientation of a country – operationalized by gatekeeping and the number of general practitioners per 1000 population. Figure 1 shows the educational inequality assessed in odds ratios (numbers close to 1 indicate low degree of inequality) plotted against the strength of gatekeeping systems. The effect is small for all measures and for health inequality also inconclusive in the direction. While in countries with a stronger gatekeeping system, inequalities assessed through functional limitations and activities of daily living are smaller, they are higher for the number of instrumental activities of daily living and the number of chronic illnesses. Gatekeeping countries show less inequality for all medical doctor visits but a higher degree of inequality for the probability of a specialist visit.



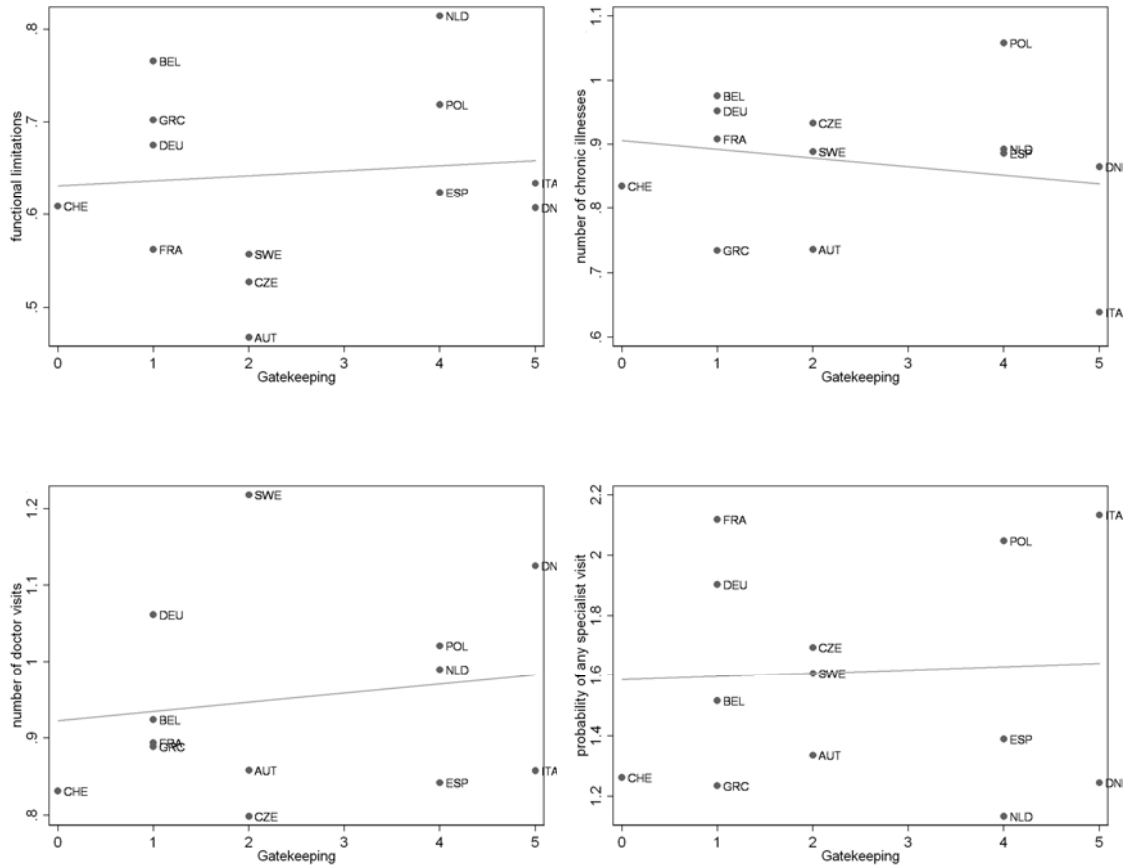


Figure 7: Odds ratios of high versus low education by the strength of gatekeeping

As a second measure for the strength of primary care systems, the availability of GPs was plotted versus the degree of health inequality. The effects for health inequality are inconsistent – with lower inequality levels with a higher availability for some of the measures but higher inequality levels for others. A higher number of GPs also increases (in contrast to the theoretical expectations) the inequality in healthcare utilization. The higher the availability of GPs the higher is the inequality level of all doctor visits disfavoring the less educated. Similarly a high availability of GPs increases a higher utilization level of specialist of individuals with a high level of education.

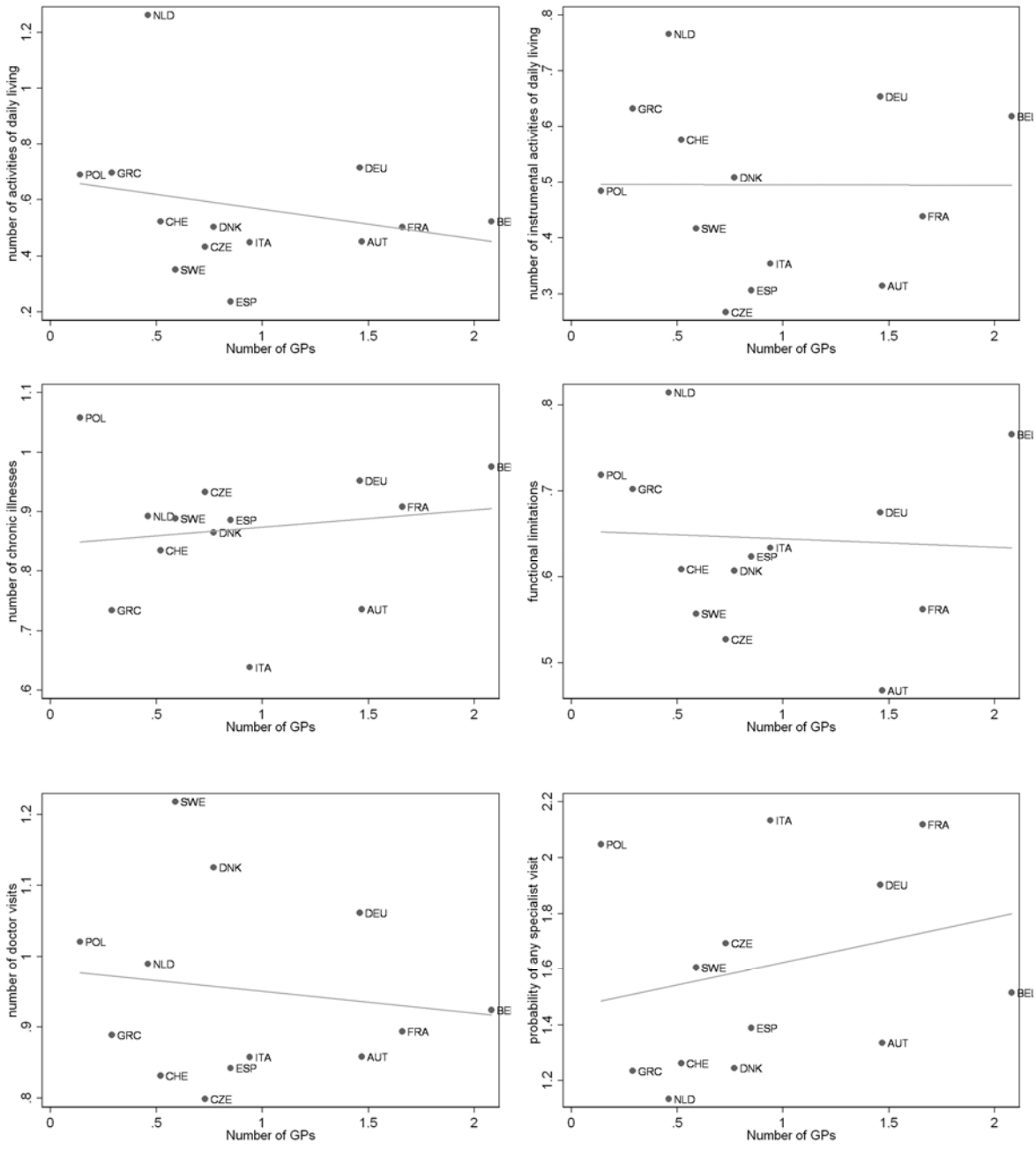


Figure 8: : Odds ratios of high versus low education by the number of GPs

Starfield & Shi (2002) have argued that a tight budget in strong primary care systems might contradict the beneficial effects of strong primary care. Therefore, I have also looked at the relationship between public expenditure per capita in purchase power parities and inequality levels. In contrast to the theoretical expectation, countries with a high level of public expenditure have higher levels of health inequality (except for IADLs). In terms of healthcare utilization countries with high public expenditure show lower levels of inequality disfavoring the less educated or even higher levels of inequality favoring the less educated. No relationship was found for the probability of any specialist visit (see figure 9).

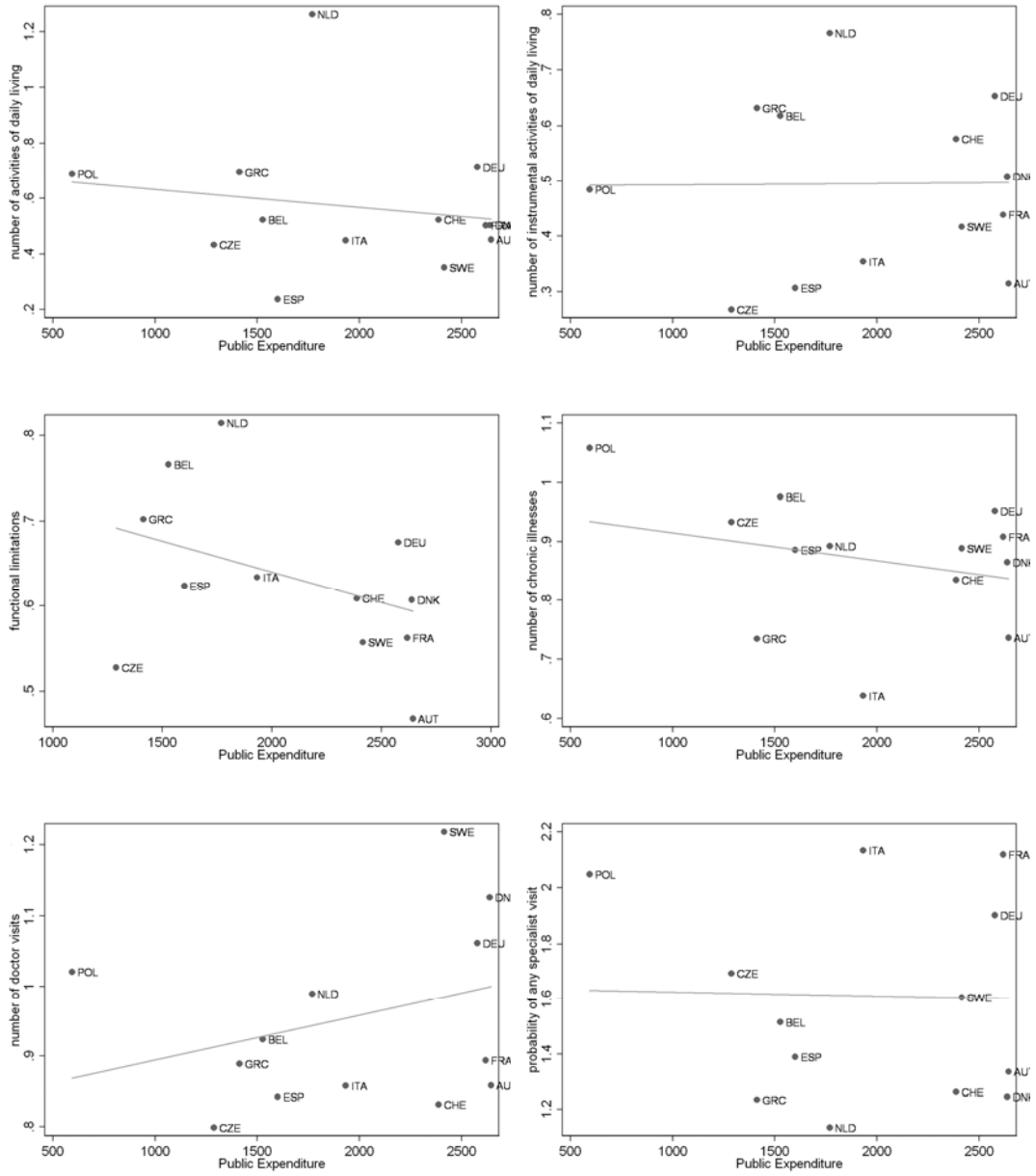


Figure 9: Odds ratios of high versus low education by public expenditure per capita

Table 6 provides correlations between the odds ratios and each macro level factor under control of the other two indicators. The table shows several significant correlations, however, most of them in the opposite direction as was expected.

Table 5: Multivariate Correlations of Education Coefficients and Health System Indicators

	Gatekeeping	*Public Expenditure*	*Number of GPs*
Number of activities of daily living	-0.03***	-0.07***	-0.21***
Number of instrumental activities of daily living	-0.25***	0.01	-0.10**
Number of functional limitations	0.09***	-0.46***	0.16***
Number of chronic illnesses	-0.17***	-0.36***	0.22***
Number of doctor visits	0.13***	0.42***	-0.26***
Probability of any specialist visit	0.17***	-0.15***	0.34***

Note: *** p<.001, ** p<.01, * p<.05.

6. Conclusion

The analyses in this paper show substantial inequalities between individuals with different levels of education even after controlling for relevant individual-level characteristics. The level of inequality also differs across countries. However, explaining these country differences turns out to be challenging. The hypothesized reduction of inequalities through strong primary care (operationalized through gatekeeping systems and the GP density) could not be confirmed. For the control variable – public expenditure per capita- I also did not find a consistent relationship to health inequalities and inequalities in healthcare utilization.

The country patterns are sometimes striking. While the high inequality levels in some of the Southern and Eastern European countries (e.g. Spain, and the Czech Republic) match expectations, Austria and Sweden also show relatively high inequality levels. The Netherlands – as a strong gatekeeping country- often shows low levels of inequality but so do Germany and Greece. Some of these patterns might be explained through limitations of data and analyses, e.g. income could be included (was not done due to many missing values).

However, it can also be interpreted as a sign that institutional regulations and availability measures do not sufficiently cover the quality and effectiveness of the primary care provided. Instead, we need indicators which assess the actual quality of the GP-patient relationship and the skills of the family physician for coordinating care. Van den Brink-Muinen et al. (2006), for instance, have shown in a six country comparison that the gatekeeping role of the GP plays almost no role in explaining the quality of the doctor-patient communication. Also perceived patient pressures has been shown to be a strong predictor of doctors' referral behavior (Little et al. 2004) and it is plausible to assume that persons with a higher level of education are more willing and more capable of putting pressure on the GP for receiving further examination.

Following this line of argument, the results indicate that merely increasing the availability of GPs and the introduction of gatekeeping does not necessarily decrease inequality levels. Instead, a focus on the quality of primary care is necessary both in the policy responses towards health inequalities and their empirical investigation.

Appendix

	AUT	BEL	CZE	DNK	FRA	DEU	GRC	ITA	NLD	POL	ESP	SWE	CHE	Total
chronic	1.54	1.60	1.78	1.68	1.52	1.49	1.48	1.88	1.25	2.14	1.72	1.63	1.13	1.62
	(1.40)	(1.47)	(1.53)	(1.57)	(1.41)	(1.43)	(1.46)	(1.71)	(1.31)	(1.71)	(1.51)	(1.50)	(1.24)	(1.52)
fl	1.76	1.44	1.52	0.95	1.41	1.41	1.76	1.83	1.00	2.72	1.88	1.15	0.75	1.52
	(2.36)	(2.14)	(2.18)	(1.74)	(2.15)	(2.18)	(2.21)	(2.45)	(1.80)	(2.79)	(2.62)	(1.80)	(1.48)	(2.23)
adl	0.22	0.22	0.16	0.14	0.20	0.20	0.16	0.23	0.11	0.51	0.31	0.15	0.10	0.21
	(0.79)	(0.71)	(0.64)	(0.64)	(0.73)	(0.78)	(0.72)	(0.86)	(0.54)	(1.18)	(1.03)	(0.62)	(0.48)	(0.78)
iadl	0.37	0.34	0.31	0.25	0.35	0.25	0.33	0.41	0.22	0.66	0.52	0.24	0.16	0.34
	(0.96)	(0.97)	(0.89)	(0.85)	(1.03)	(0.91)	(0.95)	(1.20)	(0.70)	(1.41)	(1.44)	(0.85)	(0.65)	(1.02)
alldocv	9.15	8.45	8.24	4.24	7.09	7.38	5.38	9.37	4.70	7.40	8.15	3.17	4.40	6.71
	(12.90)	(10.29)	(8.87)	(6.21)	(8.19)	(9.78)	(7.53)	(12.31)	(7.51)	(9.01)	(11.23)	(4.88)	(7.54)	(9.29)
gpdocv	6.03	5.87	5.06	3.08	4.95	4.38	3.40	7.08	2.51	5.49	6.32	1.79	2.75	4.52
	(8.92)	(7.75)	(5.64)	(4.35)	(5.86)	(6.51)	(5.01)	(10.04)	(3.36)	(6.40)	(9.31)	(2.54)	(4.72)	(6.69)
spdocvd	0.54	0.54	0.52	0.23	0.54	0.57	0.36	0.49	0.41	0.29	0.38	0.37	0.36	0.43
	(0.50)	(0.50)	(0.50)	(0.42)	(0.50)	(0.50)	(0.48)	(0.50)	(0.49)	(0.46)	(0.48)	(0.48)	(0.48)	(0.50)
male	0.42	0.47	0.44	0.47	0.44	0.47	0.46	0.46	0.46	0.45	0.47	0.47	0.46	0.46
	(0.49)	(0.50)	(0.50)	(0.50)	(0.50)	(0.50)	(0.50)	(0.50)	(0.50)	(0.50)	(0.50)	(0.50)	(0.50)	(0.50)
age	66.48	64.81	63.72	63.97	64.85	64.62	64.77	65.32	63.60	63.60	66.11	66.02	64.62	64.74
	(9.25)	(10.03)	(9.44)	(10.08)	(10.46)	(9.22)	(10.19)	(9.27)	(9.39)	(9.86)	(10.48)	(9.68)	(10.11)	(9.85)
employed	0.15	0.24	0.29	0.41	0.28	0.28	0.29	0.18	0.31	0.17	0.21	0.38	0.41	0.28
	(0.35)	(0.43)	(0.45)	(0.49)	(0.45)	(0.45)	(0.45)	(0.38)	(0.46)	(0.37)	(0.41)	(0.48)	(0.49)	(0.45)
livtog	0.64	0.74	0.70	0.75	0.71	0.81	0.72	0.82	0.81	0.76	0.79	0.77	0.71	0.75
	(0.48)	(0.44)	(0.46)	(0.43)	(0.46)	(0.39)	(0.45)	(0.39)	(0.40)	(0.43)	(0.41)	(0.42)	(0.45)	(0.43)
isced3a4	0.49	0.26	0.34	0.41	0.31	0.58	0.24	0.21	0.24	0.45	0.09	0.27	0.42	0.32
	(0.50)	(0.44)	(0.47)	(0.49)	(0.46)	(0.49)	(0.43)	(0.41)	(0.43)	(0.50)	(0.28)	(0.45)	(0.49)	(0.47)
isced5a6	0.20	0.25	0.09	0.37	0.21	0.27	0.14	0.06	0.24	0.08	0.09	0.23	0.24	0.19
	(0.40)	(0.43)	(0.29)	(0.48)	(0.41)	(0.44)	(0.34)	(0.24)	(0.43)	(0.27)	(0.28)	(0.42)	(0.43)	(0.39)
cursmok	0.15	0.17	0.22	0.27	0.14	0.16	0.28	0.17	0.22	0.26	0.16	0.15	0.19	0.20
	(0.36)	(0.38)	(0.41)	(0.44)	(0.34)	(0.37)	(0.45)	(0.38)	(0.42)	(0.44)	(0.37)	(0.35)	(0.39)	(0.40)
obese	0.55	0.50	0.62	0.43	0.43	0.51	0.57	0.52	0.45	0.59	0.62	0.45	0.41	0.51
	(0.50)	(0.50)	(0.49)	(0.50)	(0.50)	(0.50)	(0.50)	(0.50)	(0.50)	(0.49)	(0.49)	(0.50)	(0.49)	(0.50)

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