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ORIGINAL ARTICLE

An assessment of socio-economic inequalities in health among elderly in Greece, Italy and Spain

Cleon Tsimbos

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Abstract
Objective This study explores socio-economic inequalities in health among Mediterranean people aged 50 or higher.
Methods The data used in the analysis come from the Survey of Health, Ageing and Retirement in Europe, wave 1, release 2; the sample includes 2,671 Greek, 2,502 Italian and 2,343 Spanish persons. Seven health indicators are examined using age-sex standardized prevalence rates and logistic regression models. Concentration indices are also computed for self-rated health (SRH).
Results Socio-economic position of individuals declines with age. Persons of lower socio-economic position experience worse health in all instances. Independently of education and gender, Greek persons display the lowest prevalence rates for SRH and physical and depressive symptoms, Spanish exhibit the highest rates for chronic conditions, and Italians perform better regarding functional limitations. Within-country analysis shows that the magnitude of socio-economic inequalities in SRH is greatest in Greece, followed by Spain and lastly by Italy.
Conclusions The analysis reconfirms the advantage of high over low socio-economic position for all countries and health indicators and proves education as an important correlate compared to wealth and income among the elderly.

C. Tsimbos (✉)
Department of Statistics and Insurance Science,
University of Piraeus, 80, Karaoli & Dimitriou Str,
Piraeus, 185 34 Athens, Greece
e-mail: cleon@unipi.gr

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Introduction

A well-established finding in the international literature is the existence of a strong inverse relationship between health and the socio-economic characteristics of the individuals. People of lower socio-economic profile experience worse health, higher mortality, morbidity and disability rates and are more likely to suffer from certain diseases, cognitive impairment and depression (Anderson and Armstead 1995; Kunst et al. 2005; Mackenbach et al. 1997; Mackenbach et al. 2003; Materia et al. 2005). However, the mechanisms through which socio-economic status operates on health are rather unclear. The analytical difficulties in interpreting this link arise from the multidimensionality of the overall health status (Simon et al. 2005; Smith 1998), the multifaceted nature of the socio-economic position (SEP) of the individuals (Grundy and Holt 2001; Matthews et al. 2005; O' Reilly 2002) and the multiplicity of methods used for measuring and assessing diversities and differentials (Mackenbach and Kunst 1997; Wagstaff et al. 1991). Although educational qualifications, occupational class and material resources are key variables in determining the socio-economic position of an individual, there has been a lot of discussion on which measures best represent it and relate to health outcomes among the elderly.

Education operates through complex mechanisms; it is usually fixed early in life, and is associated both with income and occupation (Grundy and Holt 2001). Educated people have better knowledge of risky health behaviours, of preventive care and medical treatments, while at the

same time they use health care systems more efficiently (Freedman and Martin 1999). The role of occupation among persons in later life has been questioned as those still in employment are a minority; in addition, the degree to which working conditions in midlife still influence health among the older is unclear (Grundy and Holt 2001; Rognerud and Zahl 2005).

Income is strongly associated with employment status (Mackenbach et al. 1997) and reflects resources over a defined time period. In contrast, indicators such as assets, home ownership, household crowding and wealth capture advantages and disadvantages accumulated over the life course (Robert and House 1996) and may serve as complementary measures of SEP (Huisman et al. 2004). Income and wealth are positively correlated but they are also distinct; elderly people frequently have little income but substantial wealth (Duncan et al. 2002). The effects of the alternative SEP measures on health are not interchangeable and their impact varies across populations and over various health indicators (Elo and Preston 1996; Geyer et al. 2006; House et al. 1994; Liberatos et al. 1988; Winkleby et al. 1992). In fact, different socio-economic indicators are related to different aspects of health; hence, studies investigating the causal link between SEP and health in later life should take into account a set of measures rather than a single indicator (Duncan et al. 2002; Huisman et al. 2003; Knesebeck et al. 2007).

The aim of this study is to measure and compare socio-economic inequalities in health among people aged 50 or higher in three Mediterranean countries of similar socio-cultural characteristics and healthy life expectancies, Greece, Italy and Spain (Mathers et al. 2000; UNDP 2006). The analysis uses comparable statistical material from the Survey of Health Ageing and Retirement in Europe (SHARE). Socio-economic inequalities across seven health indicators in the countries of interest are assessed on the basis of age-standardized prevalence rates by sex, concentration indices and estimates derived from logistic regression models. As comparative studies for the Mediterranean elderly populations that take into account such a wide range of health measures are scarce, this investigation fills a gap in the relevant literature.

Methods

Data

The data used in the analysis are derived from SHARE, wave 1, release 2. This survey has collected cross-national comparable micro-data on a very wide range of variables including demographic and socio-economic characteristics, self-rated health (SRH), family networks and life satisfaction. The target population of the study is persons aged 50 or higher; the baseline was conducted in 2004 and the sampling has been carried out in 12 countries. The household response rate in Greece (63.4%) is above the overall country-weighted average (60.6%); Italy has a household response rate of 52.8% and Spain 54.3% (Börsch-Supan et al. 2005; SHARE 2008). Within households, individual response rates for Greece, Italy and Spain are 92.4, 79.1 and 72.7%, respectively, compared to the country-weighted average (85.0%). The eligible number of households with at least one respondent is 1,980 in Greece, 1,772 in Italy and 1,743 in Spain. Item non-response in health and demographic variables is hardly a problem in SHARE data; however, it affects economic variables. Possible effects of non-response on the results of the study are commented in "Discussion".

The Greek sample used in this analysis includes 2,671 persons with non-missing information on the basic socio-demographic variables; the Italian sample includes 2,502 persons and the Spanish 2,343.

Measures of health

SHARE provides information on a large number of indicators and measures of health. The questionnaire includes extended lists of 14 specific chronic diseases, 11 symptoms of ill-health, 6 limitations in activities of daily living (ADL), 7 limitations in instrumental activities of daily living (IADL), 10 mobility difficulties and 12 depressive symptoms (EURO-D). The variables used in the analysis are in binary form and indicate whether a respondent reports two or more chronic diseases diagnosed in his lifetime, two or more symptoms lasting 6 months or longer, at least one ADL limitation, at least one IADL limitation, at least one mobility difficulty and four or more depressive symptoms; the above indicators have been proposed by researches and used in a number of studies (Börsch-Supan et al. 2005; Prince et al. 1999; Verropoulou and Tsimbos 2007). In the SHARE design, a single-item question on SRH was also included; this provides valuable information as subjective health has proved a good indicator of general health that predicts morbidity and mortality (Bardage et al. 2005; Baron-Epel and Kaplan 2001; Burstrom and Fredlund 2001; Camargos et al. 2008; Idler and Benyamini 1997; Van Doorslaer and Gerdtham 2003). The respondents were asked in randomized order to evaluate their overall health condition according to two different five-point scales. In this study, the European version of SRH is employed, with answers ranging from "very good" to "very bad". For the purposes of the analysis a dichotomous variable is used, taking the value of 1 for those reporting less than good health (fair, bad, very bad) and 0 otherwise (good, very good).

Measures of socio-economic position

In this study, the socio-economic position of the individuals is measured by three variables, education, annual income and net wealth. Occupation was disregarded from the analysis due to the large amount of missing data. Combining information on current as well as last job, the overall percentage of missing information on occupation is 26.8%. Ignoring these observations was considered an unfavourable option as it would result in a substantially smaller sample which might be selected, as item non-response is usually related to socio-economic characteristics and health behaviour (Börsch-Supan et al. 2005).

In SHARE, education is expressed in terms of years of educational attainment and of categories according to international classification standards (isced-97 coding). For the purposes of the analysis two alternative variables are used. The first one is dichotomous, taking the value of 1 for those having completed at least upper secondary education (isced-97 codes 3–6) and 0 otherwise (isced-97 codes 0–2). The second variable categorizes educational attainment in four intervals: 0–6 years (none or primary education), 7–9 years (lower secondary), 10–12 years (upper secondary) and 13 years or more (tertiary). The binary version is used in the multivariate models while the four-level variable is used for constructing summary inequality indices (see below).

In the dataset, household income and household net wealth are based on reported as well as imputed values and are purchasing-power-parity adjusted (Börsch-Supan and Jürges 2005). These variables show extremely high variability and many outliers and in exploratory analysis did not significantly predict health indicators in the multivariate models, a feature reported by other studies, too (De Vogli et al. 2008). Median values of income and wealth, on the other hand, have been proved good indicators of access to economic resources (Börsch-Supan et al. 2005). The use of socio-economic variables in binary form instead of the original continuous or of more detailed categorical variables was decided for the sake of clarity and due to the small number of observations in the resulting sub-groups after cross-classification. Hence, the variables introduced in the analysis are binary and based on the pooled sample ($n = 7{,}516$). For income, the dichotomous variable is 1 for values greater than median income (>34,695 €) and 0 otherwise; for net wealth, the dichotomous variable is 1 for values greater than median net wealth (>1,359,020 €) and 0 otherwise. This approach distinguishes the pooled sample into two sub-groups of equal number of observations (high/low income or high/low wealth) but the corresponding relative distributions vary, to some extent, by country.

Statistical analysis

In describing health outcome differentials, age-standardized prevalence rates by sex are calculated to eliminate age and gender effects among persons of different countries and of low and high educational attainments. Standardization was carried out with the direct method using as standard the mean age-distribution of the populations of the three countries combined.

The relative effects of the socio-economic variables on the health outcomes are assessed estimating logistic regression models. All variables are introduced in binary form as described previously. Codes of 1 for the response variables indicate poorer health. For the socio-economic predictors, codes of 1 indicate individuals of higher SEP. Four sets of regression models are considered. In the first one, the estimates are obtained using the total number of observations (pooled sample). These models allow for comparing health aspects between countries; for the purpose of the analysis, two dummy variables are introduced separately, one for Italy (=1) and one for Spain (=1) so that the estimated odds ratios express the corresponding relative risks compared to Greece (=0). In the other three sets of models, the logistic regressions are estimated using each national sample separately, examining thus associations within each country. All models control for gender and age; females (=1) are compared to men and respondents aged 65 or higher (=1) are compared to respondents aged 50–64. The significance levels of the estimated parameters are evaluated on the basis of the Wald statistic and the overall goodness-of-fit of the regression models is assessed on the basis of the Hosmer–Lemeshow chi-square test (Hosmer and Lemeshow 2000). The statistical analysis was conducted using SPSS 16.0.

The magnitude of socio-economic inequalities in health across countries is also evaluated using concentration indices; the measures have been estimated for grouped data on the basis of the reported years of educational attainment (0–6, 7–9, 10–12, 13–22) (Kakwani et al. 1997). The choice of educational attainment was made on the grounds that education constitutes a core variable among the elderly and provides a solid and well-defined classification scheme throughout all populations under study (Grundy and Holt 2001; Jürges 2007a, b; Van Ourti 2003). Health is represented by SRH. The Concentration Index (CI) ranges from -1 to $+1$. As ill-health is measured, negative values imply that inequalities in health favour the better off while the larger the absolute size of the index the greater the magnitude of health inequality (Kakwani et al. 1997; Wagstaff 2005; Wagstaff and Van Doorslaer 1994). To control for age effects between countries, sexes and educational groups, the CIs are age standardized using the overall age-structure of the pooled sample.

Results

Descriptive findings

Overall, Greek persons display, on average, better health than the Italians who, in turn, report better health than the Spanish (Table 1). Greeks report the lowest proportions of ill-health for five out of the seven indicators. On the other hand, mobility difficulties and IADL limitations seem somewhat better among the Italians. All three populations are characterized by an excess of women who represent 58% of the Spanish, 55% of the Italians and 54% of the Greeks. The Spanish also include an excess of 65+ years olds (54%) while this segment of the population represents only 46% in the other two countries. Regarding SEP, Greeks have higher educational level but are less wealthy and have lower income. More specifically, 38% of Greeks have at least upper secondary education, compared to 22% of the Italians and about 15% of the Spanish. By contrast, Italians are better off; 61% have income above the median compared to 47% of the Spanish and to 42% of the Greeks. Finally, slightly more than half of the elderly in Spain and Italy have wealth above the median while the respective proportion for the Greeks is 43%. Further examination of the available information reveals that socio-economic position of the individuals declines with age. Mean years in education and average income and wealth calculated by broad age group and country decrease considerably with age; the estimated F statistics for testing the equality of the mean values (based on one-way ANOVA) indicate that differences in SEP by age are statistically significant in all instances (Table 2).

Age-sex standardized prevalence rates

Age-standardized prevalence rates for males and females of low and high educational attainments are presented in Table 3. In all instances the rates are higher for persons of

Table 1 Descriptive statistics

Variables in the analysis	Pooled sample (n = 7,516)			Greece (n = 2,671)		
	Valid cases	Mean	Std. dev.	Valid cases	Mean	Std. dev.
Females	7,516	0.555	0.497	2,671	0.536	0.499
Aged 65 or older	7,516	0.487	0.500	2,671	0.459	0.498
Health less than good	7,496	0.457	0.498	2,669	0.369	0.483
At least two chronic diseases	7,484	0.451	0.498	2,669	0.399	0.490
At least two symptoms	7,495	0.395	0.489	2,669	0.330	0.470
At least one ALD limitation	7,494	0.109	0.312	2,669	0.087	0.281
At least one IADL limitation	7,494	0.189	0.391	2,669	0.180	0.384
At least one mobility difficulty	7,491	0.540	0.498	2,667	0.534	0.499
At least four depressive symptoms	7,344	0.316	0.465	2,585	0.248	0.432
Education: isced three or higher	7,516	0.255	0.436	2,671	0.382	0.486
Income > median	7,516	0.500	0.500	2,671	0.422	0.494
Wealth > median	7,516	0.500	0.500	2,671	0.428	0.495
Variables in the analysis	Italy (n = 2,502)			Spain (n = 2,343)		
	Valid cases	Mean	Std. dev.	Valid cases	Mean	Std. dev.
Females	2,502	0.551	0.498	2,343	0.580	0.494
Aged 65 or older	2,502	0.465	0.499	2,343	0.540	0.498
Health less than good	2,498	0.504	0.500	2,329	0.508	0.500
At least two chronic diseases	2,486	0.449	0.498	2,329	0.513	0.500
At least two symptoms	2,497	0.392	0.488	2,329	0.474	0.499
At least one ALD limitation	2,498	0.105	0.307	2,327	0.140	0.347
At least one IADL limitation	2,498	0.140	0.347	2,327	0.251	0.433
At least one mobility difficulty	2,498	0.516	0.500	2,326	0.574	0.495
At least four depressive symptoms	2,483	0.338	0.473	2,276	0.369	0.483
Education: isced 3 or higher	2,502	0.222	0.416	2,343	0.145	0.352
Income > median	2,502	0.608	0.488	2,343	0.474	0.499
Wealth > median	2,502	0.532	0.499	2,343	0.548	0.498

Table 2 Mean years of education, mean annual income and mean net wealth by age group and *F*-statistic for testing the equality of the mean values

Age	Cases (*n*)	Education	Income	Wealth
Pooled sample (total cases = 7,516)				
50–64	3,859	8.71	33,756	450,703
65–74	2,193	5.95	25,143	343,800
75+	1,464	4.62	20,588	273,192
F-statistic		589.0***	94.8***	10.5***
Greece (total cases = 2,671)				
50–64	1,444	10.59	27,540	224,502
65–74	713	7.21	18,896	194,361
75+	514	5.45	14,819	119,222
F-statistic		330.7***	82.8***	41.6***
Italy (total cases = 2,502)				
50–64	1,338	8.14	38,599	589,780
65–74	784	6.04	29,392	384,152
75+	380	4.87	27,542	306,471
F-statistic		124.4***	25.7***	4.5**
Spain (total cases = 2,343)				
50–64	1,077	6.92	36,074	514,165
65–74	696	4.58	26,755	451,436
75+	570	3.72	21,155	389,850
F-statistic		146.8***	23.9***	1.9

Significance levels: *** $P < 0.01$; ** $P < 0.05$

lower attainment, and this holds independently of sex. On average, the largest differences in the standardized rates of low over high educational groups are noticed for IADL limitations (+170%) and for depressive symptoms (+70%) while the least differentiation can be observed for mobility difficulties (+24%) and chronic conditions (+27%). Women report worse health than men for all health domains; sex differentials by SEP are more pronounced for persons of low educational level in all health aspects with the exception of functional limitations for Greece, depressive symptoms for Italy and physical symptoms for Italy and Spain.

Comparing the age-standardized prevalence rates across countries, they are lowest for Greece as far as self-rated, physical and mental health is concerned, independently of socio-economic position and gender. Mobility and IADL limitations, on the other hand, are best for the Italian sample. Chronic conditions are more prevalent in the Spanish population and this holds independently of SEP and sex.

Inequalities between countries

Inequalities between countries are assessed on the basis of concentration indices and logistic regression models. Table 4 shows estimates of the concentration index as well as lower and upper possible bounds, for "less than good" SRH, by country and gender. The indices take into account differences in the age-structure of the samples and express

Table 3 Age-standardized prevalence rates (per 100) by low and high educational levels, sex and country

Sex	Greece		Italy		Spain	
	Low[a]	High[b]	Low[a]	High[b]	Low[a]	High[b]
Self rated health less than good						
Males	37.6	26.0	50.1	31.2	45.5	32.9
Females	49.0	29.8	59.3	38.5	56.7	35.2
Both sexes	44.2	27.5	55.4	34.7	52.1	33.7
At least two chronic conditions						
Males	36.9	30.2	42.2	38.3	44.6	40.5
Females	50.9	38.7	51.7	39.9	55.6	42.2
Both sexes	45.2	33.7	47.7	38.6	51.0	40.9
At least two physical symptoms						
Males	28.4	23.3	32.6	24.0	35.7	21.6
Females	42.1	33.7	48.1	43.2	57.6	41.4
Both sexes	36.6	27.2	41.4	34.2	48.8	30.8
At least one ADL limitation						
Males	7.5	6.0	10.6	7.4	12.0	7.2
Females	10.2	8.8	13.8	9.3	14.7	8.1
Both sexes	9.2	7.6	12.5	7.7	13.6	7.4
At least one IADL limitation						
Males	13.7	7.8	11.3	5.0	19.5	8.3
Females	25.9	16.1	21.5	7.3	29.2	10.5
Both sexes	21.1	11.0	17.1	5.3	25.3	8.6
At least one mobility difficulty						
Males	46.9	43.2	45.2	39.5	45.8	40.3
Females	61.8	57.0	61.9	49.4	66.5	42.8
Both sexes	55.7	51.1	54.8	44.5	58.2	41.3
At least four depression symptoms						
Males	16.5	12.8	28.3	15.5	23.2	16.1
Females	38.6	26.7	44.3	32.4	48.6	26.5
Both sexes	29.5	18.1	37.3	22.7	38.3	21.1

[a] Low educational level: isced 0–2

[b] High educational level: isced 3+

Table 4 Concentration indices in terms of educational attainment (indices obtained after taking into account the age-structure of the samples) by country and sex: self-rated health less than good

	Greece	Italy	Spain
Both sexes	$n = 2,669$	$n = 2,498$	$n = 2,329$
	−0.178	−0.164	−0.171
Males	$n = 1,239$	$n = 1,120$	$n = 997$
	−0.176	−0.170	−0.171
Females	$n = 1,430$	$n = 1,378$	$n = 1,352$
	−0.182	−0.137	−0.173

n Number of observations (participants) in the analysis

inequality in terms of educational attainment. The negative values of the indices show that in all instances ill-health inequalities favour the better off (i.e. the more educated population segments) although variations do exist between countries and by gender. In general, the most pronounced socio-economic inequalities in SRH are found in Greece and the least noticeable in Italy, while Spain is somewhere in between. This holds for both sexes but cross-country differentiations are wider among women.

The odds ratios derived using logistic regression on seven health indicators for the pooled sample are presented in Table 5. The Hosmer–Lemeshow test indicates that the models fit the data well. The results reveal that ill-health is gender and age related. Women have significantly worse health than men in all cases; relative disadvantage of females is more pronounced for depressive symptoms (2.7-fold), IADL limitations (2.2-fold), physical symptoms (2.2-fold) and mobility difficulties (2.1-fold). Being over age 65 is also significantly related to worse health; the age effect is particularly marked regarding physical functioning difficulties such as ADLs and IADLs for which the odds ratios are 3.64 and 3.88, respectively. By contrast, chances of depression increase rather moderately for the 65+ years olds, by about 50%.

Higher educational attainment and greater wealth are also significantly associated with better health in all instances. Income, on the other hand, does not seem as important once education and wealth are controlled for. For all indicators, odds ratios for educational attainment are lower than for wealth, signifying that the former plays a more important role in reducing chances of ill-health than the latter. For instance, having had at least upper secondary education reduces chances of suffering from one or more IADL limitations by about 65% compared to a reduction of only 29% if one's wealth is above the median. The least differentiation is estimated for mobility, where education reduces chances by 28% compared to 22% for wealth; for that indicator having income above the median also amounts to a significant reduction of 13% in the chances of experiencing such difficulties. The only other indicator significantly associated with income is SRH but, again, this is the least important SEP predictor.

Controlling for the demographic and socio-economic characteristics of the respondents in the pooled sample allows us to assess health inequalities between the countries. The findings indicate that Spanish and Italians have significantly worse health than the Greeks, with two exceptions; regarding mobility difficulties there does not seem to be any

Table 5 Odds ratios by health indicator based on logistic regressions: pooled sample

Predictors	SRH less than good (n = 7,496)	Chronic 2+ (n = 7,484)	Symptoms 2+ (n = 7,495)	ADL 1+ (n = 7,494)	IADL 1+ (n = 7,494)	Mobility 1+ (n = 7,491)	Eurod 4+ (n = 7,344)
Sex (ref: male)							
Female	1.500***	1.529***	2.180***	1.458***	2.174***	2.090***	2.714***
Age (ref: 50–64 years)							
65 or higher	2.610***	2.802***	1.910***	3.642***	3.877***	2.701***	1.475***
SEP							
Level of education (ref: low)							
High	0.451***	0.606***	0.666***	0.563***	0.353***	0.717***	0.591***
Wealth (ref: below median)							
>Median	0.729***	0.899**	0.838***	0.700***	0.714***	0.781***	0.823***
Income (ref: below median)							
>Median	0.874**	0.961	0.935	1.019	0.909	0.866***	0.902*
Country (ref: Greece)							
Spain	1.518***	1.354***	1.650***	1.546***	1.292***	1.013	1.592***
Italy	1.757***	1.173**	1.285***	1.240**	0.694***	0.898*	1.525***
Holsmer–Lemeshow test							
χ^2 (sig.)	6.1 (0.6)	6.7 (0.6)	4.0 (0.8)	1.6 (0.9)	10.2 (0.2)	21.2 (0.1)	12.3 (0,1)

n Number of observation (participants) in the models

Significance levels: *** $P < 0.01$, ** $P < 0.05$, * $P < 0.1$

Dependent variables: SRH less than good: fair, bad or very bad in the European version; Chronic 2+: reporting at least two chronic diseases; Symptoms 2+: reporting at least two symptoms; Mobility 1+: reporting at least one mobility difficulty; ADL 1+: reporting at least one limitation in activities of daily living; IADL 1+: reporting at least one limitation in instrumental activities of daily living; Eurod 4+: reporting at least four depressive symptoms

significant difference between these countries while Italians fare better with respect to IADL limitations. The odds ratios also show that, with the exception of SRH, the Spanish are less healthy than the Italians.

Inequalities within countries

The odds ratios derived using logistic regression on the aforementioned health indicators separately for Greece, Italy and Spain are presented in Table 6. These models allow us to discern the importance of each SEP indicator for each country. Again the Hosmer–Lemeshow test indicates that in all cases the models fit the data well. The odds ratios confirm that in all populations, women have significantly higher chances of poor health compared to men. The magnitude of the gender effect seems least pronounced in Italy. Increasing age is also associated with significantly worse health. Differentials between persons aged 65 or older and their younger counterparts are especially marked with respect to physical functioning difficulties, SRH and chronic conditions while they are fairly small for depressive symptoms. The age effect is more pronounced among Greeks for most indicators.

The odds ratios reconfirm that level of education is a more crucial predictor of poor health in all countries and for all indicators compared both to wealth and income. Income again seems to be the least important; it is significant only in very few instances, for SRH and mobility in Italy. Wealth for the individual countries is not as significant as implied by the pooled model. In particular, having more wealth than the median in Greece is significantly related to better health only for SRH, mobility and IADL difficulties. In Italy and Spain wealth is somewhat more important. ADL limitations in Greece do not seem related to SEP at all. Also, suffering from at least one chronic condition seems unaffected by wealth and income in all countries.

In terms of educational level, the estimated odds ratios show that for SRH, inequalities are more pronounced in Greece followed by Spain and lastly by Italy, a finding in accordance with the results obtained using the concentration indices. The regression models also show that inequalities for chronic conditions are greatest in Greece while for functional limitations and physical and depressive symptoms inequalities are more marked in Spain.

Discussion

Summary of the findings

In this paper, socio-economic inequalities in health are considered in three countries of fairly similar socio-cultural characteristics, Greece, Italy and Spain. The analysis focuses on seven domains of health among persons aged 50 or older. Differentials for such a wide range of health indicators for southern European countries have rarely been examined, if ever. In the present study, an effort was made to use the greatest possible amount of available information on the socio-economic characteristics of the respondents in SHARE. The variables included in the dataset, occupation, education, income and wealth, embody different aspects of SEP. Occupation had to be excluded from the analysis due to the large amount of missing information, particularly among Greek respondents.

The analysis shows that Spanish persons experience the highest crude prevalence rates for all health aspects, while Greeks the lowest; however, these differentials can be partly attributed to the age-sex composition of the national samples, as the Spanish include the highest proportions of aged people and of female participants. From the examination of the age-sex standardized prevalence rates three main findings are derived. First, in all instances, ill-health is more prevalent among persons of relatively low educational attainment and this holds for both males and females. Second, independently of level of education, women report worse health than men. Third, independently of education and gender, Greek persons display the lowest rates for SRH and physical and depressive symptoms, Spanish exhibit the highest rates for chronic conditions and Italians perform better with respect to IADL and mobility difficulties. Results based on the logistic regression models support these findings while estimates of the pooled models reconfirm that controlling for age, gender and SEP differentials the aforementioned differentiations between the countries hold, but mobility does not differentiate significantly.

Regarding SEP, the multivariate analysis reveals that better socio-economic position has a favourable effect on health, greater for certain conditions, such as IADL limitations and SRH. Of the different indicators, income reached statistical significance only in a couple of instances. Wealth, although significant in the pooled models, does not seem as important in the country-specific analysis. On the other hand, education clearly exerts the greatest impact. Further analysis revealed that interactions between socio-economic variables were non-significant whereas the estimates of the main effects remained unaffected. Thus, the results of this study provide evidence that education is the most important correlate of health among the elderly, a finding in accordance with other studies (Grundy and Holt 2001; Jürges 2007a; Van Ourti 2003).

Regarding the magnitude of within-country inequalities, analysis based on concentration indices shows that education-related inequalities in SRH, controlling for age and gender, are most marked in Greece and least pronounced in

Table 6 Odds ratios by country and health indicator, based on logistic regressions

Predictors	SRH less than good (n = 2,669)	Chronic 2+ (n = 2,669)	Symptoms 2+ (n = 2,669)	ADL 1+ (n = 2,669)	IADL 1+ (n = 2,669)	Mobility 1+ (n = 2,667)	Eurod 4+ (n = 2,585)
Greece							
Sex (ref: male)							
Female	1.558***	1.740***	1.928***	1.617***	2.474***	2.113***	2.982***
Age (ref: 50–64 years)							
65 or higher	3.178***	3.652***	2.223***	4.797***	5.284***	3.078***	1.406***
SEP							
Level of education (ref: low)							
High	0.434***	0.588***	0.682***	0.720*	0.448***	0.895	0.590***
Wealth (ref: below median)							
>Median	0.782***	0.899	0.917	0.778	0.724**	0.743***	0.930
Income (ref: below median)							
>Median	0.856	0.886	0.862	0.897	0.925	0.887	0.905
Holsmer–Lemeshow test							
χ^2 (sig.)	2.9 (0.9)	7.4 (0.5)	11.6 (0.1)	4.9 (0.8)	13.0 (0.1)	11.5 (0.1)	5.5 (0.7)
Predictors	SRH less than good (n = 2,498)	Chronic 2+ (n = 2,486)	Symptoms 2+ (n = 2,497)	ADL 1+ (n = 2,498)	IADL 1+ (n = 2,498)	Mobility 1+ (n = 2,498)	Eurod 4+ (n = 2,483)
Italy							
Sex (ref: male)							
Female	1.390***	1.344***	2.057***	1.396**	2.169***	1.930***	2.179***
Age (ref: 50–64 years)							
65 or higher	2.236***	2.377***	1.813***	3.695***	3.179***	2.346***	1.305***
SEP							
Level of education (ref: low)							
High	0.495***	0.624***	0.801**	0.519***	0.335***	0.696***	0.620***
Wealth (ref: below median)							
>Median	0.733***	0.935	0.765***	0.728**	0.616***	0.757***	0.844*
Income (ref: below median)							
>Median	0.761***	0.981	0.963	0.863	0.858	0.832**	0.857
Holsmer–Lemeshow test							
χ^2 (sig.)	5.4 (0.6)	12.8 (0.2)	5.0 (0.6)	8.9 (0.3)	5.8 (0.7)	6.2 (0.6)	8.1 (0.4)
Predictors	SRH less than good (n = 2,329)	Chronic 2+ (n = 2,329)	Symptoms 2+ (n = 2,329)	ADL 1+ (n = 2,327)	IADL 1+ (n = 2,327)	Mobility 1+ (n = 2,326)	Eurod 4+ (n = 2,276)
Spain							
Sex (ref: male)							
Female	1.547***	1.512***	2.590***	1.396***	1.946***	2.272***	3.241***
Age (ref: 50–64 years)							
65 or higher	2.564***	2.544***	1.740***	3.054***	3.539***	2.790***	1.781***
SEP							
Level of education (ref: low)							
High	0.452***	0.695***	0.508***	0.473***	0.256***	0.497***	0.523***
Wealth (ref: below median)							
>Median	0.695***	0.884	0.851*	0.659***	0.798**	0.852*	0.711***
Income (ref: below median)							
>Median	1.030	1.030	0.961	1.255*	0.953	0.878	0.943

Table 6 continued

Predictors	SRH less than good (n = 2,669)	Chronic 2+ (n = 2,669)	Symptoms 2+ (n = 2,669)	ADL 1+ (n = 2,669)	IADL 1+ (n = 2,669)	Mobility 1+ (n = 2,667)	Eurod 4+ (n = 2,585)
Holsmer–Lemeshow test							
χ^2 (sig.)	6.9 (0.5)	9.3 (0.3)	1.7 (0.9)	3.9 (0.8)	11.2 (0.2)	8.2 (0.4)	7.1 (0.5)

n Number of observation (participants) in the models

Significance levels: *** $P < 0.01$, ** $P < 0.05$, * $P < 0.1$

The definitions of dependent variables are the same as in Table 4

Italy while Spain is somewhere in between. This finding agrees with the results derived from the regression models.

Comparing this research to the results of a recent study examining health inequalities in a number of European countries including, among others, some regions (mainly urban) of Italy and Spain (Mackenbach et al. 2008), the main finding, i.e. worse health among persons of lower educational level, holds. However, the present estimates (2.0- and 2.2-fold difference in the SRH of low over high educational groups in Italy and Spain, respectively) are much larger than those found by the European study (1.2–1.4-fold in both countries). These differences may be partly attributed to the different age ranges studied (30–69 in the European study, 50 or higher in SHARE). Furthermore, the present analysis uses a single, homogeneous and comparable source of information, covering all regions of the countries under research instead of distinct national surveys which are subject to variations in the validity and reliability of the health and socio-economic data collected (De Vogli et al. 2008).

There is also another large European study using data on persons aged 25 or higher from the European Social Survey which estimates smaller educational inequalities in SRH than the present study; nevertheless, Greece is again found exhibiting greater inequalities compared to Italy and Spain (Von dem Knesebeck et al. 2006). The results of the present analysis, however, do not support the hypothesis that countries with comparatively large inequalities have lower educational level in the population.

A merit of the present study is that application of different approaches to the data (age-sex standardized rates, health concentration indices, logistic regression models) resulted in consistent conclusions with respect to between-country differences and within-country associations of SEP over the selected health indicators.

Methodological issues

In multi-country studies, particularly in those involving various aspects of health, a main problem in obtaining meaningful measures of health inequalities is the different ways health status and the socio-economic position of the individuals are defined. The strength of this study is that SHARE provides comparable cross-country statistical information on both health as well as socio-economic variables. Even so, it is well known that people of different countries or different socio-economic groups have different perceptions and expectations concerning health and consequently tend to evaluate their health status in a different way (Dowd and Zajacova 2007; Singh-Manoux et al. 2007). According to the recent research based on SHARE data, if differences in reporting styles of SRH are taken into account, the observed cross-country variations are reduced but they are not eliminated (Jürges 2007a).

The household response rate in SHARE does not differ much from comparable studies such as the ELSA and the HRS; the rates of the countries under investigation are around the average (60.6%) and the individual response behaviour was quite satisfactory (Börsch-Supan et al. 2005). However, there is some evidence that non-response occurs more frequently among persons of lower socio-economic groups (d'Uva et al. 2008; Sonne-Holm et al. 1989); in such a case, the results of this study may underestimate the actual extent of health inequalities among the elderly populations under research. Besides, SHARE excludes the institutionalized population from the survey. Such an exclusion of the least healthy and often deprived segment of the oldest old population is likely to result in underestimation of the prevalence rates of ill-health.

Finally, as the data used in the analysis are cross-sectional, no inference on the direction of causality between ill-health and socio-economic status can be made. This may be amended in the near future when data from wave 2 become available, where the longitudinal design of the survey may throw light on this aspect.

Implications

Health inequality is a public problem with social and political implications (Sen 1997). Policy makers are to be informed about health discrepancies measured by various indices before they propose approaches to reduce existing

undesired differentials. The present study supports the idea that education, income and wealth are simultaneously operating covariates (Deaton 2002), but gives credit to education as the most decisive correlate among the elderly.

Future strategies for the EU include, among others, two health care policy objectives, namely to maintain universal access for all and to upgrade the quality of the system in a broad sense (Vignon 2005). In many instances, however, health care systems provide dissimilar care for persons of different socio-economic status. This may be more evident in the less developed regions or deprived areas of the same country. The association between health and SEP holds for all different socio-economic levels so that the gradient does not seem to be linked merely to poverty (Goldman 2001). Although measures targeted to underprivileged population groups are relieving, an effective policy targeting of health inequalities requires the existence of generous social protection systems and the application of universal pension and sickness programmes (CSDH 2008).

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