Socio-Economic Determinants of Health in Croatia: Insights from Four Cross-Sectional Surveys

Ivan Čipin
University of Zagreb, Faculty of Economics and Business, Croatia
icipin@efzg.hr

Šime Smolić
University of Zagreb, Faculty of Economics and Business, Croatia
ssmolic@efzg.hr

CroEconSur
Vol. 15
No. 1
April 2013
pp. 25-60

Received: December 14, 2012
Accepted: February 16, 2013
Research Article

Abstract

The World Health Organization (WHO) sees health as a resource for everyday life, a fundamental human right and, especially important for economists and social scientists, an essential component of the economic and social development of every modern society. Health determinants which could lead to better health outcomes can arise from both the social and economic side. The main goal of this paper is to exploit several cross-sectional socio-economic data sets available in Croatia to examine the extent to which individual health is related to certain demographic and economic determinants. In explaining health determinants, self-assessed health (SAH) was used as a measure of health on the individual level, and the proportional odds model was applied for the ordinal outcome variable. Controlling for age and other socio-demographic characteristics, education was seen as the single most important determinant of better health. Poor health on

the individual level is probably highly correlated with low education and lowest income levels. Public policy-makers should be aware that measures targeted at vulnerable population subgroups might be effective at improving health in the population. However, the identification of a causal relationship between health outcome and its determinants is of crucial importance in the design of future policies.

Keywords: self-assessed health, age, gender, educational level, income, Croatia

JEL classification: I14

1 Introduction

Among the main goals of a country's health care system, the goal of improving the health status of the vulnerable groups in the population should be a priority. Improvement of health status of disadvantaged population subgroups will lead to the better health of the total population, especially in countries where the size of the vulnerable population subgroup is quite high. Moreover, all segments of the economy would gain from the improved population health (Preston, 1975; Barro, 1996; Bloom and Canning, 2003). Which factors contribute to unequal health outcomes? Determinants of health vary, and it is hard to establish a causal relationship on the individual level without panel micro data. Numerous studies in economics, public health and epidemiology have reported cross-sectional correlation between socio-demographic and socio-economic status and individual level of health (see Idler and Benyamini, 1997). Income and education are well-documented determinants of health on a micro-level basis globally, but such research is lacking on the Croatian population. To the best of our knowledge, few existing studies take into account the importance of low income (see Šućur and Zrinšćak, 2007) and lower educational status as factors that could worsen the individual health status. Although some previous studies (Galić, Maslić Seršić and Šverko, 2006) have examined the correlation between

financial resources and the health of unemployed persons in Croatia, more work is needed to reveal the important social determinants of health in Croatia. In the absence of panel data, an analysis of existing cross-sectional data sets could be valuable to show the degree of correlation for a future longitudinal analysis.

The aim of this paper is to employ several cross-sectional data sets available in Croatia to examine the extent to which individual health is related to certain demographic and economic characteristics, namely education and income. When explaining health outcome, self-assessed health (SAH) is used as a measure of health on the individual level. Self-assessed (or self-rated) health is often included in many socio-economic surveys and there are numerous analyses of the relationship between self-assessed health and socio-economic status.

This paper is organized as follows. Section 2 provides a review of the literature linking SAH with social determinants of health. In Section 3 we describe data sets and the samples used in our analysis, together with some methodological explanations of the main statistical procedure. Section 4 presents the main descriptive and inferential results of ordered logistic regression, while Section 5 discusses the findings and provides some policy implications and suggestions for future studies.

2 Literature Review

Self-assessed health (SAH) is often included in general socio-economic surveys, sometimes as a valid indicator of health, while in contrast there is a debate in the literature about its validity (Jones et al., 2007). SAH is a simple subjective measure of health. This categorical variable is measured with a single question on an individual's perception of his or her own health providing an ordinal ranking of perceived health status, often from (very) poor to very good/excellent. It is a strong predictor of mortality, state of human body and mind (see, for example, Mossey and Shapiro, 1982; Sørenson, 1988; Idler and Benyamini, 1997; Jylhä, 2009), and a predictor of survival or use of medical care (e.g., Leinonen,

Heikkinen and Jylhä, 1998). There are, however, some uncertainties about SAH, e.g., "it does not provide a cardinal (utility) health scale... and categorical measures of health create a problem for measurement of inequalities in health" (van Doorslaer and Jones, 2003: 62). However, in some studies SAH is found to be a non-significant predictor of mortality, especially in studies where only older people are included in the samples (Idler and Angel, 1990). Lindeboom and van Doorslaer (2004) explain that this is like "speaking different languages", when different groups use different reference points when they respond to the same question. Some groups of people, e.g. older individuals, often tend to revise their response about SAH if asked twice within the same questionnaire (Crossley and Kennedy, 2002), thus leading to significant difference in the answers about their SAH. Other factors such as socio-demographic characteristics, health risk behaviors, and medical diagnoses of respondents are very important in predicting mortality. That is actually the second direction of SAH studies: aiming to locate the *determinants* of self-reported health. Perception of health has proven to be very complex, influenced by many factors, socio-economic (e.g., income inequality or educational level), demographic, cultural or political (Mackenbach, 1994; Kunst, Geurts and van den Berg, 1995; Kawachi et al. 1997; Kawachi, Kennedy and Glass, 1999; Mackenbach et al., 2008).

Educational level is a common predictor in the studies of SAH determinants, both in the national and cross-country studies. In the study of Canadian household population, Cott, Gignac and Badley (1999) conclude that people aged 55 or less, those with higher degree of education and higher income reported excellent and very good health more often compared to those older than 55, with lower levels of education or lower income. Kennedy (2003) addresses some interesting features regarding health and education in Canada and Australia. SAH in these two countries declines with age, increases with income, and increases with level of education. In addition, he finds the relationship between SAH and education to be present relatively early in age (age group 25-29), and it remains roughly constant across all age groups. The pronounced conclusions of Grossman and

Kaestner (1997) about education and health are that education improves health and vice versa, and education and health are related through their interaction with a third variable. Another interpretation of the empirical relationship between health and education is that individuals who invest relatively more in education will also invest more in health. According to Grossman (1999: 66) "... causality relation from schooling to health results when more educated persons are more efficient producers of health". Individuals with higher degree of education can obtain larger health output from the given amount of inputs. On the other hand, more years of schooling increases information about the true effects of the inputs on health. Mirowsky and Ross (2003) describe the relation between health and education, claiming that education is the main cause of health inequality because it symbolizes human capital, i.e., cognitive skills and abilities that can be used to manage one's own life and provide resources beyond economic gains. Besides those already mentioned, a plethora of studies come to the same conclusions of a straight relationship between higher educational level and higher category of SAH (e.g., Bobak et al., 1998; Carlson, 1998; Bobak et al., 2000; Etilé and Milcent, 2006). Their results are in line with the basic assumption of the demand for health model that efficiency of health production rises with educational level (Grossman, 1972).

Income[1] is another important SAH predictor, strongly associated with health, indicating socio-economic status. It is well known that material resources (deprivation) may influence health indirectly by imposing financial constraints on healthy behavior and, more directly, by affecting living conditions and other factors associated with financial and material disadvantage (Laaksonen et al., 2005). Mackenbach et al. (2005) reveal that a higher household income is associated with better SAH among men and women, particularly in the middle-income range in the research of seven European countries.[2] In the research of socio-economic inequalities in health in 22 European countries, prevalence of

1 Net (after-tax) incomes of all household members are often used including transfers, thereby eliminating the differences between men and women. In some studies these are corrected for the household size.

2 Belgium, Denmark, England, Finland, France, the Netherlands, and Norway.

the lowest category of SAH appears to be greater among lower socio-economic groups, i.e., those having lower income.[3] However, income-related inequalities in SAH are not larger in Eastern than Western European regions; actually, they are large in the regions with large income inequalities (Mackenbach et al., 2008). This is consistent with the evidence that "inequalities in SAH by income level are smaller in countries with smaller income inequalities, such as the Nordic countries" (Mackenbach, 2006: 20). Unlike substantial studies in the United States or Canada where the income inequality hypothesis is strongly supported, i.e., the higher the (nationwide) level of income, the better the level of SAH (see, for example, Kennedy et al., 1998; Humphries and van Doorslaer, 2000; Blakely, Kennedy and Kawachi, 2001), some individual country studies reveal different association between income and SAH. Carlson (1998) examines the east-west divide in SAH among people in the 35-64 age group in the 25 European countries, and the most powerful predictor of SAH is the people's economic satisfaction. Material deprivation rather than income from principal employment turns out to be a significant predictor of SAH in some Eastern European countries.[4] Using data on middle-aged adults in Helsinki, Laaksonen et al. (2005) examine socio-economic inequalities in SAH. As in the earlier analyses, personal education and occupational class show consistent associations with health, while association with income vanishes after adjustment for socio-economic indicators. Home ownership and economic difficulties, but not the household income, remain associated with health after full model adjustment. The estimates of Etilé and Milcent (2006) demonstrate that the effect of a rise in income on SAH varies according to the individual's initial income and initial level of SAH, and that there is some income-related reporting heterogeneity in SAH in France. Results of the ordered *logit* model of Oshio and Kobayashi (2008) reveal that prefecture-level income inequality in Japan does matter for general SAH and the likelihood of reporting good health. Among demographic factors, only age was significant – older individuals report lower SAH – while

3 Including individuals with lower levels of education and in manual occupations.

4 There is also the problem of reporting lower personal income in post-communist countries.

gender and marital status do not affect the health assessment significantly. Similarly, perceptions of good health among Canadians have been linked to better socio-economic status, being younger and being male (Cott, Gignac and Badley, 1999). In the study for Croatia and EU countries, Šućur and Zrinšćak (2007) report that the proportion of Croatian citizens with poor health status was highest in the lowest income quartile.

Many authors analyze the relationship between *gender* and SAH. In some cases, significant differences among the sexes are revealed (e.g., Bambra et al., 2008; Jerdén et al., 2011), while in others gender differences in SAH are not confirmed (Leinonen, Heikkinen and Jylhä, 1998; Leinsalu, 2002). Bambra et al. (2008) find that a significantly higher proportion of women in Denmark, Sweden, Italy, the Netherlands, Portugal and Norway report their health to be "bad" or "very bad" as compared to men. The reverse situation is found in the UK and Finland, while in Belgium, France and Germany there are no significant gender differences in SAH. The association between *occupational status* and SAH or *economic activity* and SAH, has been in the focus of researchers, with pronounced differences in SAH between manual and non-manual workers, employed, unemployed and inactive (mainly retired) individuals. From the literature we can conclude that a higher prevalence of poor or moderate SAH is reported in manual than in non-manual workers (Leinsalu, 2002; McFadden et al., 2008; 2009), and a higher prevalence of lower SAH and excess mortality in men and women who are unemployed (Leinsalu, 2002; Giatti, Barreto and César, 2010; Janković, Janević and von den Knesebeck, 2012). From the same multinational and individual country studies it is possible to note the use of *marital status* as a predictor of SAH. The conclusion about the impact of marital status on SAH is ambiguous. A wide variety of published research has shown lower mortality and morbidity rates for married persons when compared with non-married groups (e.g., Lindström, 2009). Marital status was not related to self-rated health in Russia (Bobak et al., 1998), and higher levels of poor health in unmarried subjects were not found in seven post-communist countries[5] (Bobak

5 Russia, Estonia, Lithuania, Latvia, Hungary, Poland, Czech Republic.

et al., 2000). In Estonia "marriage or cohabitation as opposed to never having been married, or being widowed, separated or divorced, was associated with low risk for men but increased risk for women" (Leinsalu, 2002: 853).

Studies of the determinants of SAH in Croatia are rare, and we could only emphasize the work of Šućur and Zrinšćak (2007). The authors apply cross-country analyses to investigate the differences in self-reported health status and access to health care according to different income groups, urbanization level, and regional distribution in Croatia and European Union countries. They conclude that important health inequalities in Croatia are present, and they are higher than in the EU member states.

3 Data and Methods

The empirical analysis in this paper is based on four data sets of surveys which were carried out in Croatia in the five year period between 2006 and 2011. Data were derived from the International Social Survey Programme (ISSP), the European Values Study (EVS) and the European Social Survey (ESS). All of these data sets contain a single-item measure of self-rated health which assesses individual health perception on an ordered scale. The data sets used in this paper are described in detail below.

3.1 International Social Survey Programme (ISSP)

The International Social Survey Programme (ISSP) is a continuous program of cross-national collaboration running annual surveys on topics important for the social sciences. The program started in 1984 and by 2012 had grown to nearly 50 member countries from all over the world. ISSP is designed to study societal processes by combining a cross-time with a cross-national perspective.[6] In this paper we use national data for Croatia from the ISSP 2007 module Leisure Time

6 For more details on the ISSP, see the ISSP website at: http://www.issp.org/index.php.

and Sports (ISSP Research Group, 2009). In ISSP 2007, detailed background information is available on 1,200 participants in the survey, including information about age, sex, marital status, highest educational level, current employment status, persons in household, family income and estimation of personal health. The interviews were conducted using a face-to-face paper and pencil (PAPI) method. The fieldwork was carried out from October 1, 2006 to November 30, 2006. The multistage sampling procedure was used and fieldwork was done by the Institute for Social Research in Zagreb. The sample used in our statistical analysis consists of 696 survey participants aged 25 to 92 years. The main reason for this lower number is the restriction of the sample to participants older than 24 years in order to better capture the effect of higher education and due to missing values on family income variable. No weighting factor was available and these unweighted data could be biased due to under- or over-representation of some population subgroups.

3.2 European Values Study (EVS)

The European Values Study (EVS) is a large-scale, cross-national, and longitudinal survey research program on how Europeans think about family, work, religion, politics and society. Repeated every nine years, the survey provides insights into the ideas, beliefs, preferences, attitudes, values, and opinions of citizens all over Europe. EVS draws random probability samples with a net sample size of approximately 1,500. A representative sample of the Croatian adult population living in private households (aged 18 years and older) consisted of 1,525 individuals (EVS, 2010). Multistage probability sampling in three stages was used in face-to-face interviews with a standardized questionnaire (PAPI). The data collector was the University of Zagreb, Faculty of Law, Department of Social Work and the fieldwork period lasted from April 31, 2008 to October 31, 2008 (EVS, GESIS, 2010). Data in the data set are weighted by gender and age. The data used in this paper are from EVS 2008 – 4th wave, and micro-level data include, among others, information on self-assessment of own health, as

well as demographic data on sex, age (year of birth), current legal marital status, highest educational level attained, employment status and scale of household income. The working (weighted) sample for the empirical analysis consisted of 1,068 individuals aged 25 to 91 years, and weighting adjustment was applied to correct for selection bias.

3.3 European Social Survey (ESS)

The European Social Survey (ESS) is a biennial cross-sectional, academically-driven multi-country survey, which has been administered in over 30 countries to date. ESS has three goals: firstly, to monitor and interpret changing public attitudes and values within Europe and to investigate how they interact with Europe's changing institutions; secondly, to advance and consolidate improved methods of cross-national survey measurement in Europe and beyond; and thirdly, to develop a series of European social indicators, including attitudinal indicators (ESS Round 4: European Social Survey, 2012; ESS Round 5: European Social Survey, 2012). The fourth and fifth round of the survey was fielded in Croatia. The ESS employs rigorous quality controls, and a random probability sample drawn in each of the participating countries has to meet predefined methodological standards. Data in Croatia in both rounds were collected by the Ivo Pilar Institute of Social Sciences. The fieldwork for the 4th round took place between December 22, 2008 and March 31, 2009, and for the 5th round between September 16, 2011 and December 14, 2011. The survey sample in the 4th and 5th round was 1,484 and 1,649 individuals, respectively. The sampling design used by the Croatian survey specialists was stratified three-stage probability sampling, and PAPI method was used in both rounds. There are two weights in the ESS data set: design weight and population size weight. Although ESS methodological standards are high, the two weights currently available do not adjust for non-response in the sample. In our single country analysis we use design weight, as recommended by ESS survey documentation. Each wave consists of a core module and rotating modules. The numerous survey

questions (the face-to-face interview lasts, on average, an hour) include questions on physical and mental health, age, gender, legal marital status, highest level of education, employment status, and household's total net income. The working (weighted) sample of the 4th round consists of 933 valid cases of individuals aged 25 to 89 years, and the 5th round comprises 984 valid cases of individuals aged 25 to 99 years.

3.4 Self-Assessed Health

Self-assessed health (SAH) is a commonly used measure of individual health status, usually consisting of five categories. In general, SAH is measured on an ordinal scale, with possible responses ranging from "very poor" or "poor" to "very good" or "excellent". The two most commonly used five-point scales for self-assessed health are the asymmetric scale, ranging from "excellent" to "poor", and the symmetric scale, ranging from "very good" to "very poor".

This measure of subjective health, when used as an outcome variable, is in many empirical studies collapsed into a binary variable of good versus poor health. This dichotomization requires more theoretical statistical justification as it involves loss of information and may lead to reduced efficiency in the statistical analysis (Agresti, 2010). The literature suggests that ordered regression models can be used when considering an ordered categorical variable, such as SAH (McKelvey and Zavoina, 1975). If the scaling of the variable is available, a good alternative is the interval regression approach (van Doorslaer and Jones, 2003).

Questions on SAH appear in many cross-national household surveys such as the ones used in this paper: ISSP, EVS and ESS. This subjective health measure has been found to be a good predictor of mortality and morbidity (Idler and Benyamini, 1997); therefore, it is commonly used in the analysis of socio-economic determinants of health inequalities in the area of health economics and epidemiology. Respondents in the previously mentioned surveys were asked to rate their health status in a similar but somewhat different manner, which

could have an effect on the comparison of the results. ISSP contains this type of question concerning SAH: *"In general, would you say your health is… excellent, very good, good, fair or poor?"* In the EVS, one's SAH status is given in response to the question *"All in all, how would you describe your state of health these days? Would you say it is... very good, good, fair, poor or very poor?"* ESS in both rounds asks the respondents this question: *"How is your health in general? Would you say it is... very good, good, fair, bad, or very bad?"* ISSP uses the asymmetrical scale, while both EVS and ESS use the symmetrical scale. The EVS question aims to summarize an individual's general state of health at the moment of the interview, while ESS and ISSP aim to capture an individual's health status in general. Differential reporting of health (the use of different threshold levels) across individuals with the same health status due to the influence of age, gender, education, income, language etc. has been well known in the literature as a reporting bias (Kerkhofs and Lindeboom, 1995; Lindeboom and van Doorslaer, 2004; Sadana et al., 2000). When reporting and interpreting results, one should always consider this problem as well as the fact that there are different ways of asking the same question on SAH.

Self-assessed health (SAH) is the outcome variable. Our statistical models are intended to capture the association between SAH and several important socio-economic variables, with education and income as the main predictors. SAH is measured on an ordinal 5-point Likert-type scale. We have recoded the scale of the health measure in the surveys to emphasize that higher numbers correspond to better health. Responses are now coded in increasing order of health. For example, "very poor" health is coded 1 instead of the original coding of 5, whilst "very good" health is coded as 5 instead of 1.

3.5 Predictors of Self-Assessed Health

Predictors of SAH as subjective health determinants are highest educational level attained and household income, additionally controlling for sex (gender),

age (year of birth), current legal marital status and employment status. All variables are measured (or transformed) on a categorical scale of measurement. Categorical health determinants included in the analysis are the following: (i) sex (gender): male vs. female; (ii) age group: three groups, 25-39, 40-59 and 60 and over (reference); (iii) educational level: the highest level of education completed is available at three levels: primary education or below (ISCED 0-2), secondary level of education (ISCED 3-4) and tertiary education (ISCED 5-6), with tertiary education as the reference category; (iv) marital status: married, separated/divorced, widowed and unmarried (reference category); (v) dummy variables have been constructed to represent activity status, focusing on the employment of the respondents: employed, unemployed (actively and not actively seeking employment) and retired; (vi) household income was measured as an ordinal categorical variable with highest level of income as the reference category.

3.6 The Model

When the categories of the outcome variable have a natural order, ordinal logistic regression is a suitable choice for modeling (Long, 1997; Agresti, 2010).

Mathematically, the ordinal logistic regression model is expressed as:

$$\ln(Y_j') = \ln\left(\frac{\pi_j(x)}{1-\pi_j(x)}\right) = \alpha_j + \left(-\beta_1 X_1 - \beta_2 X_2 - \ldots \beta_p X_p\right) \quad (1)$$

where π_j is the probability of being at or below category j of an ordinal variable with k categories, $1 \le j \le k$-1.

There are several types of ordinal logistic regression models, and we use the proportional odds model. The proportional odds model is the default form of ordinal logistic regression provided by statistical software used for statistical analysis in this paper. The reason why it is called the proportional odds model is an assumption of parallel lines, which tell us that the effect of the predictor

variable is the same regardless of where the cut point is made. When interpreting the results of our models, a minus sign in front of the coefficients for the predictor variables (odds ratio lower than 1) means that lower scores of outcome are more likely, while a positive coefficient (odds ratio higher than 1) tells us the opposite, that higher scores across the ordinal scale are more likely.

The ordered logit model can be expressed as a latent variable model (Long, 1997; Agresti, 2010). Assuming a latent variable, y^*, exists, we can define:

$$y^* = x\beta + \varepsilon \ . \tag{2}$$

Predictor variables are introduced into the model by making the latent variable y^* a linear function of the *Xs*, and adding a logistic distributed error term. Maximum likelihood estimation is then used to estimate the parameters of the model. In our case, the continuous latent variable can be thought of as the propensity to state better subjective health. Let y^* be divided by some unknown thresholds (cut points): $\alpha 1$, $\alpha 2$, $\alpha 3$, $\alpha 4$ and $\alpha 5$ and $\alpha 1 < \alpha 2 < \alpha 3 < \alpha 4 < \alpha 5$.

$$y_i = \begin{cases} 1 & if\ \alpha_0 = -\infty \le y^* < \alpha_1 \\ 2 & if\ \alpha_1 \le y^* < \alpha_2 \\ 3 & if\ \alpha_2 \le y^* < \alpha_3 \\ 4 & if\ \alpha_3 \le y^* < \alpha_4 \\ 5 & if\ \alpha_4 \le y^* < \alpha_5 = \infty \end{cases} \tag{3}$$

The observed self-rated health is the ordinal outcome, *y*, ranging from 1 (very poor or poor) to 5 (very good or excellent).

4 Results

4.1 Data and Descriptive Statistics

As previously stated, respondents aged 25 and older in Croatia were selected from the four different data sets: ISSP 2007, EVS 2008 and ESS rounds 4 and 5. There is a shared opinion that people younger than 25 were difficult to classify by their socio-economic status. Many of them still live with their parents or have not completed their schooling yet, and there is a problem of the unemployment rate among people younger than 25 (e.g., see Leinsalu, 2002; Huijts, Monden and Kraaykamp, 2010). After this selection there were 696 respondents from ISSP, 1,068 from EVS, 933 from ESS 4th round, and 984 from ESS 5th round left for our analyses.

Tables 1 and 2 depict the distributions of outcome and predictor variables within four different data sets. It is obvious that the majority of respondents report their health status being "good" or better. On the other hand, depending on data set, we could say that one out of six to eight individuals in the examined samples reports poor or very poor health. The descriptive characteristic of the samples indicates that the share of female respondents is somewhat higher, as in total population. In each of the four samples, the majority of the respondents have secondary education. According to ISSP and EVS, 61 percent are married, while in the ESS 5th round almost 76 percent of respondents are married.

Figures 1 and 2 show the differences in age and education by SAH category. Age and educational level are shown in regression analyses as the two single most important predictors of SAH in Croatia. The overall prevalence of (very) good or excellent SAH ranged from 18 (ISSP 2007) to 35 percent (ESS 4) among individuals with tertiary education (Figure 1). On the other hand, the prevalence of (very) poor SAH increased with age, and was the highest in the age group 60+ (Figure 2).

Table 1: *Distribution of Socio-Economic and Demographic Features, and Self-Assessed Health among Men and Women Aged 25 and Over in Croatia from the ISSP 2007 and EVS 2008*

	ISSP		***EVS***	
Variable		**Unweighted %**		**Weighted %**
SAH	Poor	14.7	Very poor	3.1
	Fair	25.4	Poor	13.1
	Good	34.6	Fair	29.8
	Very good	16.2	Good	38.6
	Excellent	9.1	Very good	15.3
Age	25-39	26.9	25-39	28.0
	40-59	39.1	40-59	40.2
	60+	34.1	60+	31.8
Gender	Male	44.7	Male	47.5
	Female	55.3	Female	52.5
Educational level	Primary and below	39.8	Primary and below	25.9
	Secondary	45.4	Secondary	54.0
	Tertiary	14.8	Tertiary	20.2
Employed		40.5		49.8
Unemployed		11.9		12.1
Retired		34.5		31.0
Marital status	Married	61.2	Married	61.1
	Widowed	16.7	Widowed	14.5
	Divorced	4.2	Divorced	4.6
	Separated	1.0	Separated	0.3
	Never married	17.0	Never married	17.6
Household income	≤ 2200	22.6	≤ 1102.5	6.7
	2201 - 4000	23.1	1102.5-2205	14.3
	4001 - 6000	20.7	2205-3675	17.1
	6001 - 9000	18.4	3675-5512.5	18.9
	≥9001	15.2	5512.5-7350.5	15.1
			7350.5-11025	15.3
			≥11025	12.8

Table 2: *Distribution of Socio-Economic and Demographic Features, and Self-Assessed Health among Men and Women Aged 25 and Over in Croatia from the ESS Round 4 and 5*

	ESS 4		***ESS 5***	
Variable		**Weighted %**		**Weighted %**
SAH	Very poor	2.2	Very poor	2.7
	Poor	10.0	Poor	11.5
	Fair	30.5	Fair	27.6
	Good	30.7	Good	31.3
	Very good	26.6	Very good	26.9
Age	25-39	34.7	25-39	24.6
	40-59	41.4	40-59	45.6
	60+	23.9	60+	29.7
Gender	Male	47.4	Male	46.4
	Female	52.6	Female	53.6
Educational level	Primary and below	19.4	Primary and below	21.3
	Secondary	55.6	Secondary	59.5
	Tertiary	25.0	Tertiary	19.1
Employed		48.2		43.8
Unemployed		7.9		7.8
Unemployed, not looking for job		5.3		5.6
Retired		27.6		36.6
Marital status	Married	73.1	Married	75.9
	Separated	0.1	Separated	0.1
	Divorced	3.4	Divorced	2.8
	Widowed	7.1	Widowed	9.9
	Never married	16.3	Never married	10.5
Household income	≤ 2600	19.6	≤ 2426	12.5
	2601 - 5500	32.7	2427-5536	34.8
	5501 - 8200	22.0	5537-8094	28.1
	≥8201	25.7	≥8095	24.6

Figure 1: *SAH and Educational Level (SAH categories in ESS 4 and 5 are same as in ESV), in %*

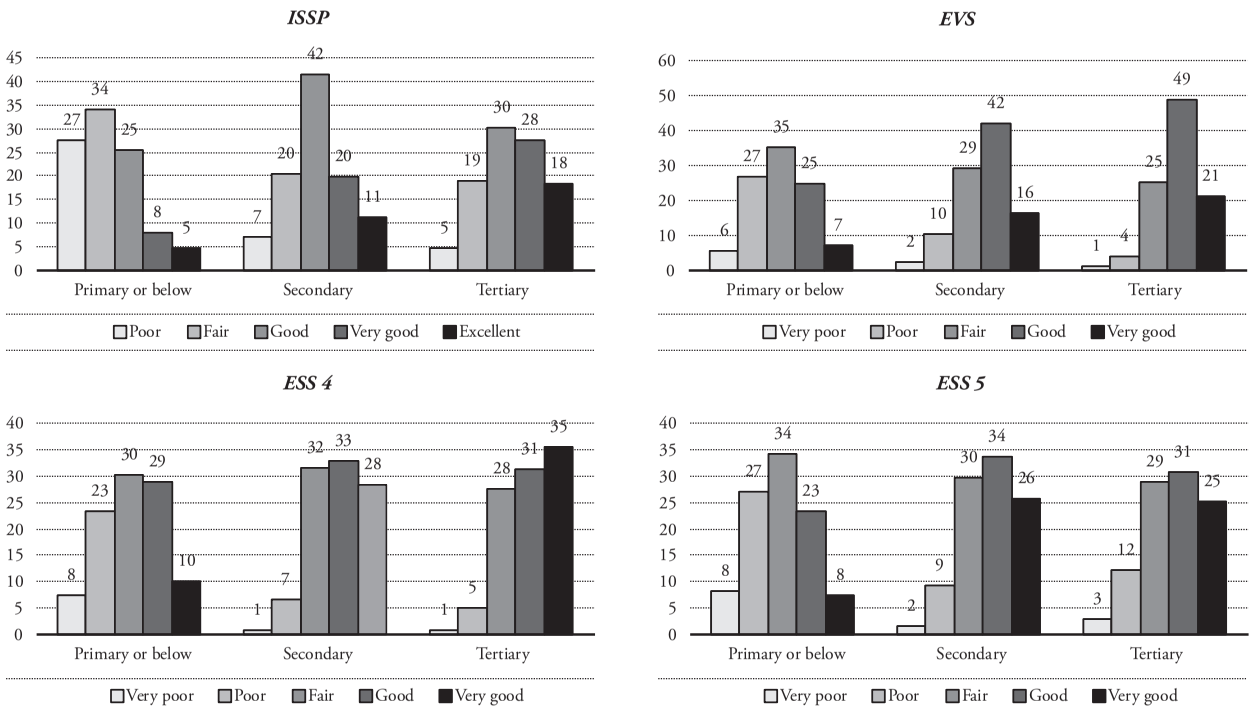
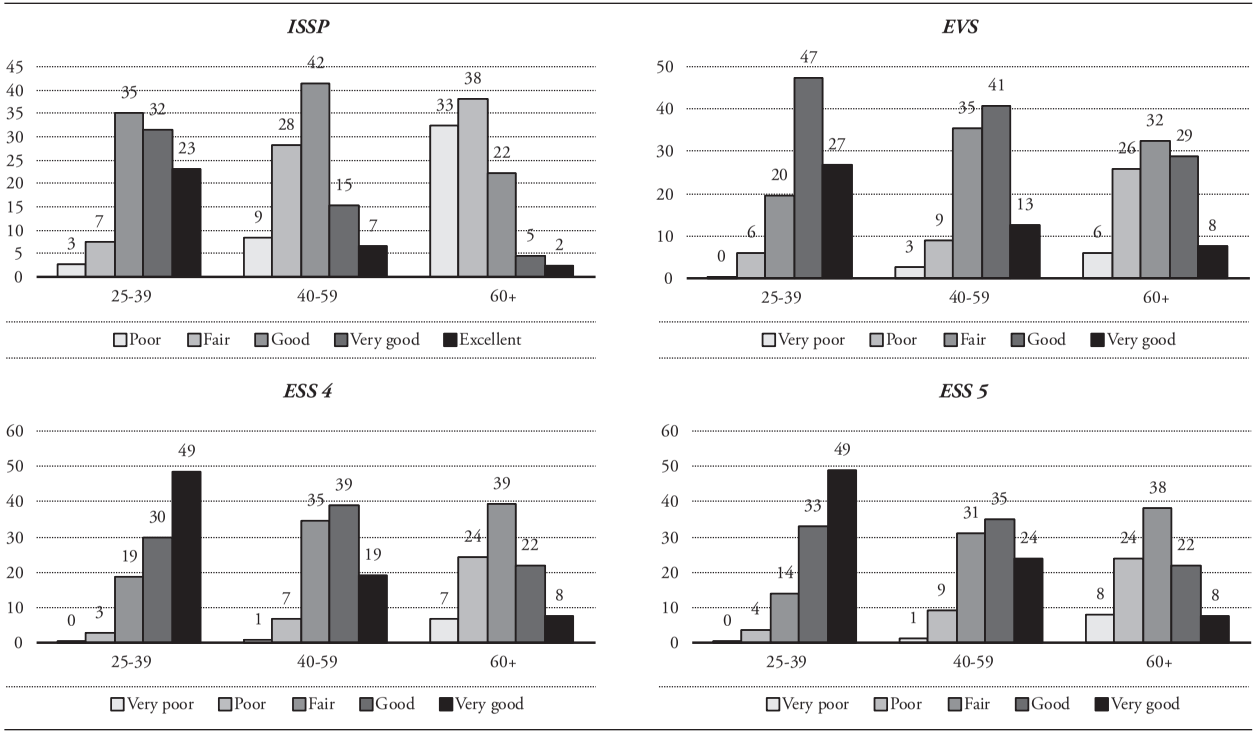


Figure 2: *SAH and Age (SAH categories in ESS 4 and 5 are same as in ESV), in %*



4.2 Inferential Findings

The results of the ordered logistic regression models are shown in Tables 3 and 4.[7] The tables present odds ratios and their 95 percent confidence intervals, with reference category in the brackets.

Age

Age of the respondents is a strong significant predictor of SAH. Younger respondents (age group 25-39) are more likely to report higher categories of SAH (i.e., better health) than the oldest age group (60 and over) in all four analyzed data sets. Average odds ratios (OR) ranging from 2.84 to 5.96 indicate several times higher likelihood of younger versus older respondents to be in a higher category of the subjective health status measure, controlling for the rest of the predictors in the models. The results for age group 40-59 also follow a similar path, except the differences are far less pronounced, and in one data set are insignificant.

Marital Status

We could not find a clear significant impact of marital status on SAH, and compared with the never married group, married people do not report significantly higher or lower likelihood (odds ratio) to be in a higher category of SAH. Only in categories separated/divorced/widowed do we find a significant but weak negative relationship.

7 We estimated the partial proportional odds model with ESS 4 and ESS 5 data due to violation of the proportional odds assumption, and the results are mainly consistent with the used ordinal logit model, leading to similar conclusions. Models with EVS and ISSP data do not violate the assumption of parallel lines. The results of this additional statistical analysis are available on request from the authors.

Table 3: *Odds Ratios (OR) with* p*-values and 95 Percent Confidence Intervals (CI) from the Ordered Logistic Regression of the Self-Assessed Health (SAH) of Men and Women Aged 25 and Over in Croatia; ISSP 2007 and EVS 2008*

ISSP [a]			*EVS* [b]		
	OR	**95% CI**		**OR**	**95% CI**
Cut points (excellent)			**Cut points (very good)**		
Poor	-2.78 ***	(-3.98 / -1.58)	Very poor	-4.52 ***	(-5.68 / -3.35)
Fair	-0.95	(-2.14 / -0.25)	Poor	-2.57	(-3.71 / -1.43)
Good	1.16 ***	(-0.03-2.35)	Fair	-0.83 ***	(-1.96-0.31)
Very good	2.66 ***	(1.45-3.86)	Good	1.29 ***	(0.15-2.44)
Gender (female)			**Gender (female)**		
Male	1.778***	(1.30-2.43)	Male	1.45 ***	(1.13-1.87)
Marital status (never married)			**Marital status (never married)**		
Married	0.70	(0.47-1.06)	Married	1.34	(0.97-1.85)
Widowed	0.96	(0.52-1.74)	Widowed	0.89	(0.55-1.44)
Divorced	0.46 *	(0.20-1.06)	Divorced	1.24	(0.53-2.96)
Separated	0.59	(0.15-2.23)	Separated	0.3	(0.07-1.36)
			Registered partnership	1.61	(0.86-3.01)
Age category (60+)			**Age category (60 +)**		
25-39	5.96 ***	(3.31-10.74)	25-39	3.64 ***	(2.32-5.70)
40-59	2.30 ***	(1.42-3.73)	40-59	1.45 *	(1.00-2.11)
Educational level (tertiary)			**Educational level (tertiary)**		
Primary or below	0.34 ***	(0.21-0.56)	Primary or below	0.38 ***	(0.26-0.56)
Secondary	0.62 *	(0.42-0.94)	Secondary	0.65 **	(0.48-0.88)
Employed (other)	0.69	(0.42-1.14)	Employed (other)	0.73	(0.44-1.21)
Unemployed (other)	0.53 *	(0.30-0.95)	Unemployed (other)	0.56 *	(0.32-0.96)
Retired(other)	1.80 *	(1.06-3.05)	Retired (other)	0.84 *	(0.51-1.39)
Household income (≥9001)			**Household income (≥11025)**		
≤ 2200	0.60 *	(0.36-1.00)	≤ 1102.5	0.37 ***	(0.19-0.72)
2201-4000	0.75	(0.48-1.18)	1102.5-2205	0.72	(0.43-1.19)
4001-6000	1.05	(0.67-1.65)	2205-3675	0.68	(0.43-1.09)
6001-9000	1.10	(0.68-1.78)	3675-5512.5	0.79	(0.51-1.21)
			5512.5-7350.5	0.81	(0.51-1.30)
			7350.5-11025	0.88	(0.57-1.35)

Notes: * p<0.05, ** p<0.01, *** p<0.001; reference category is in the brackets; [a] unweighted statistics, [b] weighted statistics.

Table 4: *Odds Ratios (OR) with* p*-values and 95 Percent Confidence Intervals (CI) from the Ordered Logistic Regression of the Self-Assessed Health (SAH) of Men and Women Aged 25 and Over in Croatia; ESS 4th and 5th round*

	ESS 4[c]			***ESS 5[d]***	
	OR	**95% CI**		**OR**	**95% CI**
Cut points (very good)			**Cut points (very good)**		
Very poor	-5.05 ***	(-6.74 / -3.36)	Very poor	-4.83 ***	(-6.82 / -2.83)
Poor	-3.00 ***	(-4.67 / -1.38)	Poor	-2.85 ***	(-4.78 / -0.93)
Fair	-0.98	(-2.61 - 0.65)	Fair	-1.01 **	(-2.92-0.89)
Good	0.60 ***	(-1.02 - 2.22)	Good	0.68	(-1.21-2.56)
Gender (female)			**Gender (female)**		
Male	0.99	(0.75-1.32)	Male	0.80	(0.60-1.06)
Marital status (never married)			**Marital status (never married)**		
Married	0.75	(0.48-1.16)	Married	0.85	(0.55-1.31)
Widowed	0.50	(0.10-2.71)	Widowed	0.59	(0.33-1.06)
Divorced	1.14	(0.52-2.48)	Divorced	0.83	(0.37-1.88)
Separated	0.53 *	(0.26-0.97)	Separated	0.02	(0.01-0.04)
			In a legally reg. civil union	0.56	(0.16-1.87)
Age category (60 +)			**Age category (60 +)**		
25-39	3.74 ***	(2.16-6.46)	25-39	2.84 ***	(1.65-4.91)
40-59	1.66 *	(1.10-2.52)	40-59	1.27	(0.82-1.98)
Educational level (tertiary)			**Educational level (tertiary)**		
Primary or below	0.45 ***	(0.29-0.70)	Primary or below	0.57 *	(0.33-0.97)
Secondary	0.83	(0.60-1.17)	Secondary	0.95	(0.63-1.41)
Employed (other)	0.50 ***	(0.30-0.82)	Employed (other)	0.81	(0.45-1.46)
Unemployed (other)	0.70	(0.38-1.27)	Unemployed (other)	0.58	(0.26-1.33)
Unemployed, not looking for job (other)	1.50	(0.88-2.56)	Unemployed, not looking for job (other)	2.43	(1.29-4.58)
Retired (other)	0.62	(0.30-1.29)	Retired (other)	0.92 **	(0.45-1.88)
Household income (≥8201)			**Household income (≥8095)**		
≤ 2600	0.96	(0.58-1.59)	≤ 2426	0.34 ***	(0.17-0.67)
2601-5500	1.17	(0.79-1.74)	2427-5536	0.54 ***	(0.35-0.85)
5501-8200	1.00	(0.68-1.47)	5537-8094	0.79	(0.53-1.18)

Notes: * p<0.05, ** p<0.01, *** p<0.001; reference category is in the brackets; [c, d] weighted statistics.

Education

Educational level proves to be strongly associated with better SAH. Individuals with primary educational level or lower (with or without finished elementary school) and secondary educational level are significantly less likely to report a higher category of SAH than those with tertiary level of education. The education variable remained significant in all four models for low levels of education. In more than 50 percent of cases, people with low levels of education in Croatia are, on average, less likely to report better health levels compared to people with higher education. All four data sets clearly show that less education leads to poorer health. It is clear from all four data sets that less education leads to lower odds of being healthier. It should be stated, however, that middle levels of education do not show the same amount of difference as low levels of education. Secondary education is found to be statistically significant but weak in ISSP and EVS data sets, and clearly less pronounced overall difference exists between secondary and tertiary levels of education.

Sex (Gender)

There is no significant association between gender and SAH in the models within ESS data sets. On the other hand, in the models employing the ISSP and EVS data sets, sex differences are statistically significant for self-rated health. Croatian males are about 78 percent and 45 percent more likely to report higher categories of SAH, respectively, controlling for the rest of the variables in the models.

Employment Status

Within employment status, dummies for the *employed* category are found to be significant only with ESS round 4 data and dummies for the *unemployed* variable are significant in ISSP and EVS data. Results in both cases show lower likelihood to report better health category, as compared to all other in the sample. Retired

people are, contradictorily, less (EVS and ESS 5) and more likely (ISSP) to report higher categories of SAH than the individuals of other employment status.

Income

The predictor *household income* is significant only for the lowest income group in three data sets. Comparing the highest and the lowest household income, people in the lowest income group are 1.7 to 2.9 times less likely to report higher categories of SAH than individuals in the highest income group.

5 Discussion

In this paper we tried to investigate the key socio-economic and demographic characteristics of self-assessed health (SAH) in Croatia. The European Social Survey, European Values Study and International Social Survey Programme contain substantial socio-economic, socio-demographic, psychological, political, and various other items but they provide relatively sparse health information such as data on morbidity. Although self-rated health could be a valid proxy for morbidity, further detailed work with other data is needed to carry out specific health status analysis on micro-level data.

Several important findings arise regarding our research questions, e.g., to what extent do respondents of different age, household income, gender or educational level tend to report different categories of SAH. We conclude that age is the most significant predictor of reporting a higher category of SAH, i.e., older people are more likely to report (very) poor health than people in younger age groups. This finding is in line with many previous studies, and it is interesting from the aspect of demographic ageing which is especially pronounced in Croatia. Latest census data in Croatia reveal continued demographic deterioration with the share of the population aged 65+ reaching almost 18 percent (DZS, 2013). When analyzing demographic ageing, it is important to mention HLE (healthy life expectancy),

which is closely related to life expectancy at birth, life expectancy at the age of 65 as well as subjective health indicators. In 2010 healthy life expectancy in Croatia at the age of 65 was 6.4 years both for men and women.[8] It is expected that men in Croatia will spend on average 57.3 years and women 60.7 years in good health, less than the average of 61.7 years for men and 62.6 for women in the EU (Eurostat, 2013). In the next few decades, life expectancy will certainly continue to rise, increasing the share of older population. A relatively small part of the population (i.e., 65-year-olds and older) accounts for the majority of health care expenditures and, therefore, health authorities should try to provide access to care that would improve those people's health.[9]

Educational level is the second most important predictor of SAH in our analyses. Higher level of education is significantly associated with a higher category of SAH in Croatia; individuals with lower education, i.e., primary education or below and secondary education are more likely to report (very) poor health. Therefore we can support Grossman and Kaestner's (1997) statement that education improves health and human capital. Many other studies reveal the same or similar results (e.g., Kunst, Geurts and van den Berg, 1995; Kawachi, Kennedy and Glass, 1999; Liensalu, 2002; Mackenbach et al., 2008; Mackenbach, Meerding and Kunst, 2011), and Croatia is not an exception. A strong association between education and health is well explored in Western countries, and investments in improving the education of the population could result in reducing health care losses. Mackenbach, Meerding and Kunst (2011) report huge inequality-related losses to health in the EU countries.[10] Overall health losses were calculated under the assumption of equal average health of people with secondary education and lower to that of people with higher than secondary education.

Increased expenditures on education, both private and public, should contribute to better self-perceived health. Furthermore, this could reduce the overall

8 In the EU countries the same indicator for men was 8.7, and for women 8.8 years.

9 Extending the life years spent in good health.

10 They estimated total welfare loss was 9.4 percent of GDP of the EU.

demand for health services leading to reduction in total health care and social security expenditures. In the future, should the number of people with a higher educational level increase, Croatia could experience an improvement of the average well-being of the population. Just like good health status, higher educational level could enable people to engage in formal and informal labor activities and to be more productive (Mackenbach, Meerding and Kunst, 2011).

The relationship between health and income level is also well established: a rise in the level of income improves an individual's health, and good health status enables people to enjoy work. The lowest income groups in Croatia (based on a net monthly income per household) show a lower probability of reporting better health status, compared to the reference group (EVS and ISSP data set). Some other data sources show that Croatia also had four times more people with very poor health in the first income quintile than the EU countries in 2010 (Eurostat, 2013).

Household income proves to be a significant predictor of health among men and women in different studies (see, for example, Mackenbach et al., 2005; Mackenbach, 2006), and this income inequality between the poorest and richest in Croatia could lead to aggravations of national social environment, e.g., increased mortality of the most vulnerable groups of the population.

However, we could not provide strong evidence supporting significant health differences between different income levels as with different educational levels. One possible explanation why there is a strong association between level of education and health but not between income and health could be that education includes income. Individuals with higher levels of education are more likely to have higher income, are more aware of their health problems and probably have better access to advanced health care services. In all four models, when other health determinants such as education are included in the model, the effect of household income on health substantially drops and in some data sets loses its statistical significance.

Employment status affects an individual's health, and unemployment is often related to the poor health and negative health outcomes. Negative effects on one's health can be observed within groups of long-term unemployed people. Even though long-term unemployment is one of the main characteristics of the labor market in Croatia, according to Eurostat's data (2013), unemployed individuals in Croatia report better health than those in the EU. However, this is not the case with retired people. A possible explanation of better health of the unemployed Croatians could be their accommodation to long-lasting unemployment, an issue that has been present in Croatia for the past two decades. It seems that this problem will persist in the medium run as well, negatively affecting the health status of young unemployed people. The average health will continue to deteriorate as the numbers of retired people (a group with the lowest socio-economic status) continue rising.

Health care policy interventions that are aimed at improving health will have long-lasting effects if they place special emphasis on prevention. A research by Mackenbach, Meerding and Kunst (2011) clearly shows that the economic costs of socio-economic inequalities in health may be substantial. The main activity that can be used to reduce health inequalities is focusing on the most disadvantaged population subgroups, e.g., older people, people in lower income groups and with lower educational level. When compared to the EU, the proportions of people in Croatia who are in good health are lower in all main age groups. The differences are noticeable in older age groups, e.g. 50+, especially after retirement. An increased number of people in older age will foster an increase in the share of people with chronic illness. In 2010 Croatia had 38 percent of people with chronic illness or longstanding health problems, one of the highest numbers in Europe (Eurostat, 2013). Dealing with these health issues will require an increase in health expenditures, e.g., for long-term care. However, in the situation of insufficient funding for health care, the quality of health care services could diminish.

The emphasis in the Croatian health care system has too often been on addressing problems after they occur rather than trying to prevent them. Health care strategies and the evaluation of health outcomes have relied mostly on objective indicators such as life expectancy, morbidity or mortality, but nowadays they have to be accompanied by subjective health measures. Public policy-makers should be aware that measures targeted at vulnerable population subgroups might be effective at improving overall health in the whole population. In addition, as Mackenbach, Meerding and Kunst (2011: 412) stress "…health improvement can be seen as a key strategy for income growth and poverty reduction in low-income and middle-income countries".[11] Increased spending for prevention programs and/or education could moderate many negative effects of demographic ageing. The chances for reaching the "ideal" living style present in Western countries are very small within the next few decades, but Croatian society should aspire towards it.

In empirical research the identification of a causal relationship between health outcome and its determinants is of crucial importance for the design of future policies. For that matter, this work has one limitation, namely cross-sectional design of all the surveys. The cross-sectional data are not able to reveal the causal relationship between education and health, or any other health determinant. To shed light on the causal relationship, we need panel data, not available at the moment in Croatia. On the other hand, there could be other factors not included in our models, which may help to explain inequalities in reporting SAH. To conclude, data used for health outcome are self-reported, and reporting bias could be a potential problem (see, for example, Idler and Angel, 1990; Kunst, Geurts and van den Berg, 1995; Leinsalu, 2002). One should bear all that in mind before jumping to conclusions based on the evidence provided in this paper.

11 A conclusion from the 2001 report of the WHO Commission on Macroeconomics and Health.

Literature

Agresti, Alan, 2010, *Analysis of Ordinal Categorical Data*, 2nd Edition, New York, NY: Wiley.

Bambra, Clare, Daniel Pope, Debbi Stanistreet, Viren Swami, Irina Stirbu and Anton E. Kunst, 2008, "Gender and health inequalities in welfare state regimes: a cross-national study of twelve European countries" in Erasmus MC - University Medical Centre Rotterdam, "Tackling Health Inequalities In Europe: An Integrated Approach (Eurothine)", pp. 231-246, Rotterdam: University Medical Centre Rotterdam.

Barro, Robert, 1996, "Health and Economic Growth", mimeo, Cambridge, MA: Harvard University.

Blakely, Tony A., Bruce P. Kennedy and Ichiro Kawachi, 2001, "Socioeconomic Inequality in Voting Participation and Self-Rated Health", *American Journal of Public Health*, 91(1), pp. 99-104.

Bloom, David E. and David Canning, 2003, "The Health and Poverty of Nations: From Theory to Practice", *Journal of Human Development*, 4(1), pp. 47-71.

Bobak, Martin, Hynek Pikhart, Clyde Hertzman, Richard Rose and Michael Marmot, 1998, "Socioeconomic factors, perceived control and self-reported health in Russia. A cross-sectional survey", *Social Science & Medicine*, 47(2), pp. 269-279.

Bobak, Martin, Hynek Pikhart, Clyde Hertzman, Richard Rose and Michael Marmot, 2000, "Socioeconomic factors, material inequalities, and perceived control in self-rated health: cross-sectional data from seven post-communist countries", *Social Science & Medicine*, 51(9), pp. 1343-1350.

Carlson, Per, 1998, "Self-perceived health in east and west Europe. Another European health divide", *Social Science & Medicine*, 46(10), pp. 1355-1366.

Cott, Cheryl A., Monique A. M. Gignac and Elizabeth M. Badley, 1999, "Determinants of self rated health for Canadians with chronic disease and disability", *Journal of Epidemiology and Community Health*, 53(11), pp. 731-736.

Crossley, Thomas F. and Steven Kennedy, 2002, "The reliability of self-assessed health status", *Journal of Health Economics*, 21(4), pp. 643-658.

DZS (Croatian Bureau of Statistics), 2013, *Statistical yearbook* 2012, http://www.dzs.hr/Hrv_Eng/ljetopis/2012/sljh2012.pdf (accessed January 5, 2013).

ESS Round 4: European Social Survey, 2012, ESS-4 2008 Documentation Report, Edition 5.1. Bergen, European Social Survey Data Archive, Norwegian Social Science Data Services.

ESS Round 4: European Social Survey Round 4 Data, 2008, Data file edition 4.1. Norwegian Social Science Data Services, Norway – Data Archive and distributor of ESS data.

ESS Round 5: European Social Survey, 2012, ESS-5 2010 Documentation Report, Edition 3.0. Bergen, European Social Survey Data Archive, Norwegian Social Science Data Services.

ESS Round 5: European Social Survey Round 5 Data, 2010, Data file edition 3.0. Norwegian Social Science Data Services, Norway – Data Archive and distributor of ESS data.

Etilé, Fabrice and Carine Milcent, 2006, "Income-related reporting heterogeneity in self-assessed health: evidence from France", CNRS-EHESS-ENPC-ENS Working Paper, No. 2006-9, Paris-Jourdan Sciences Economiques.

Eurostat, 2013, *Eurostat New Cronos database*, http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/search_database (accessed February 11, 2013).

EVS, 2010, European Values Study 2008, 4th wave, Croatia, GESIS Data Archive, Cologne, Germany, ZA4775 Data File Version 1.0.0 (2010-11-30), doi:10.4232/1.10051, http://dx.doi.org/10.4232/1.10051 (accessed February 11, 2013).

EVS, GESIS, 2010, EVS 2008 Method Report, GESIS-Technical Reports 2010/17, http://www.europeanvaluesstudy.eu/ (accessed February 11, 2013).

Galić, Zvonimir, Darja Maslić Seršić and Branimir Šverko, 2006, "Financial circumstances and health of unemployed persons in Croatia: does financial deprivation lead to poorer health?", *Revija za socijalnu politiku*, 13(3-4), pp. 257-269.

Giatti, Luana, Sandhi M. Barreto and Cibele C. César, 2010, "Unemployment and self-rated health: Neighborhood influence", *Social Science & Medicine*, 71(4), pp. 815-821.

Grossman, Michael, 1972, *The Demand for Health: A Theoretical and Empirical Investigation*, New York, NY: National Bureau of Economic Research.

Grossman, Michael, 1999, "The human capital model of the demand for health", NBER Working Paper, No. 7078, April, Cambridge, MA: NBER.

Grossman, Michael and Robert Kaestner, 1997, "Effects of Education on Health" in Jere R. Behrman and Nevzer Stacey, eds., *The Social Benefits of Education*, pp. 69-123, Ann Arbor, MI: University of Michigan Press.

Huijts Tim, Christiaan W. S. Monden and Gerbert Kraaykamp, 2010, "Education, Educational Heterogamy, and Self-Assessed Health in Europe: A Multilevel Study of Spousal Effects in 29 European Countries", *European Sociological Review*, 26(3), pp. 261-276.

Humphries, Karin H. and Eddy van Doorslaer, 2000, "Income-related health inequality in Canada", *Social Science & Medicine*, 50(5), pp. 663-671.

Idler, Ellen L. and Ronald J. Angel, 1990, "Self-Rated Health and Mortality in the NHANES-1 Epidemiologic Follow-up Study", *American Journal of Public Health*, 72(8), pp. 446-452.

Idler, Ellen L. and Yael Benyamini, 1997, "Self-rated health and mortality: a review of twenty-seven community studies", *Journal of Health and Social Behavior*, 38(1), pp. 21-37.

ISSP Research Group, 2009, International Social Survey Programme: Leisure Time and Sports - ISSP 2007, GESIS Data Archive, Cologne, ZA4850 Data File Version 2.0.0, http://doi:10.4232/1.10079 (accessed February 11, 2013).

Janković, Janko, Teresa Janević and Olaf von den Knesebeck, 2012, "Socioeconomic inequalities, health damaging behavior, and self-perceived health in Serbia: a cross-sectional study", *Croatian Medical Journal*, 53(3), pp. 254-262.

Jerdén, Lars, Gunilla Burell, Hans Stenlund, Lars Weinehall and Erik Bergström, 2011, "Gender Differences and Predictors of Self-Rated Health Development Among Swedish Adolescents", *Journal of Adolescent Health*, 48(2), pp. 143-150.

Jones, Andrew M., Nigel Rice, Teresa Bago d'Uva and Silvia Balia, 2007, *Applied Health Economics*, London: Routledge.

Jylhä, Marja, 2009, "What is self-rated health and why does it predict mortality? Towards a unified conceptual model", *Social Science & Medicine*, 69(3), pp. 307-316.

Kawachi, Ichiro, Bruce P. Kennedy and Roberta Glass, 1999, "Social Capital and Self-Rated Health: A Contextual Analysis", *American Journal of Public Health*, 89(8), pp. 1187-1193.

Kawachi, Ichiro, Bruce P. Kennedy, Kimberly Lochner and Deborah Prothrow-Stith, 1997, "Social Capital, Income Inequality, and Mortality", *American Journal of Public Health*, 87(9), pp. 1491-1498.

Kennedy, Bruce P., Ichiro Kawachi, Roberta Glass and Deborah Prothrow-Stith, 1998, "Income distribution, socioeconomic status, and self rated health in the United States: multilevel analysis", *British Medical Journal*, 317(7154), pp. 917-921.

Kennedy, Steven, 2003, "The Relationship between Education and Health in Australia and Canada", Social and Economic Dimensions of an Aging Population Research Papers, No. 93, February, Hamilton: McMaster University.

Kerkhofs, Marcel and Maarten Lindeboom, 1995, "Subjective health measures and state dependent reporting errors", *Health Economics*, 4(3), pp. 221-235.

Kunst, Anton E., Jose J. M. Geurts and Jaap van den Berg, 1995, "International variation in socioeconomic inequalities in self reported health", *Journal of Epidemiology and Community Health*, 49(2), pp. 117-123.

Laaksonen, Mikko, Ossi Rahkonen, Pekka Martikainen and Eero Lahelma, 2005, "Socioeconomic Position and Self-Rated Health: The Contribution of Childhood Socioeconomic Circumstances, Adult Socioeconomic Status, and Material Resources", *American Journal of Public Health*, 95(8), pp. 1403-1409.

Leinonen, Raija, Eino Heikkinen and Marja Jylhä, 1998, "Self-rated health and self-assessed change in health in elderly men and women – A five-year longitudinal study", *Social Science & Medicine*, 46(4-5), pp. 591-597.

Leinsalu, Mall, 2002, "Social variation in self-rated health in Estonia: a cross-sectional study", *Social Science & Medicine*, 55(6), pp. 847-861.

Lindeboom, Maarten and Eddy van Doorslaer, 2004, "Cut-point shift and index shift in self-reported health", *Journal of Health Economics*, 23(6), pp. 1083-1099.

Lindström, Martin, 2009, "Marital status, social capital, material conditions and self-rated health: a population-based study", *Health Policy*, 93(2-3), pp. 172-179.

Long, J. Scott, 1997, *Regression Models for Categorical and Limited Dependent Variables* (Advanced Quantitative Techniques in the Social Sciences Series), Thousand Oaks, CA: Sage Publications.

Mackenbach, Johan P., 1994, "Socioeconomic inequalities in health in the Netherlands: impact of a five year research programme", *British Medical Journal*, 309(6967), pp. 1487-1491.

Mackenbach, Johan P., 2006, *Health Inequalities: Europe in Profile*, http://ec.europa.eu/health/ph_determinants/.../ev_060302_rd06_en.pdf (accessed December 20, 2012).

Mackenbach, Johan P., Pekka Martikainen, Caspar W. N. Looman, Jetty A. A. Dalstra, Anton E. Kunst and Eero Lahelma, 2005, "The shape of the relationship between income and self-assessed health: an international study", *International Journal of Epidemiology*, 34(2), pp. 286-293.

Mackenbach, Johan P., Willem J. Meerding and Anton E. Kunst, 2011, "Economic costs of health inequalities in the European Union", *Journal of Epidemiology and Community Health*, 65(5), pp. 412-419.

Mackenbach, Johan P., Irina Stirbu, Albert-Jan R. Roskam, Maartje Schaap, Gwenn Menvielle, Mall Leinsalu and Anton E. Kunst, 2008, "Socioeconomic Inequalities in Health in 22 European Countries", *The New England Journal of Medicine*, 358(23), pp. 2468-2481.

McFadden, Emily, Robert Luben, Sheila Bingham, Nicholas Wareham, Ann-Louise Kinmonth and Kay-Tee Khaw, 2008, "Social inequalities in self-rated health by age: Cross-sectional study of 22 457 middle-aged men and women", *BMC Public Health*, 8(230), http://www.biomedcentral.com/1471-2458/8/230 (accessed December 2, 2012).

McFadden, Emily, Robert Luben, Sheila Bingham, Nicholas Wareham, Ann-Louise Kinmonth and Kay-Tee Khaw, 2009, "Does the association between self-rated health and mortality vary by social class?", *Social Science & Medicine*, 68(2), pp. 275-280.

McKelvey, Richard D. and William Zavoina , 1975, "A statistical model for the analysis of ordinal level dependent variables ", *Journal of Mathematical Sociology*, 4(1), pp. 103-120.

Mirowsky, John and Catherine E. Ross, 2003, *Education, social status, and health*, Hawthorne, NY: Aldine de Gruyter.

Mossey, Jana M. and Evelyn Shapiro, 1982, "Self-rated health: a predictor of mortality among the elderly", *American Journal of Public Health*; 80(4), pp. 800-808.

Oshio, Takashi and Miki Kobayashi, 2008, "Income inequality, poverty, social welfare, and self-rated health: a multilevel analysis in Japan", http://www.econ.kobe-u.ac.jp/doc/seminar/DP/files/0815.pdf (accessed December 10, 2012).

Preston, Samuel, 1975, "The Changing Relation between Mortality and Level of Economic Development", *Population Studies*, 29(2), pp. 231-248.

Sadana, Ritu, Colin D. Mathers, Alan D. Lopez, Christopher J. L. Murray and Kim Moesgaard-Iburg, 2000, "Comparative analysis of more than 50 household surveys on health status", GPE Discussion Paper, No. 15, Geneva: EIP/GPE/EBD, World Health Organization.

Sørenson, Knut Holtan, 1988, "State of health and its association with death among old people at three-year follow-up", *Danish Medical Bulletin*, 35(6), pp. 597-600.

Šućur, Zoran and Siniša Zrinšćak, 2007, "Differences that Hurt: Self-perceived Health Inequalities in Croatia and European Union", *Croatian Medical Journal*, 48(5), pp. 653-666.

Van Doorslaer, Eddy and Andrew M. Jones, 2003, "Inequalities in self-reported health: validation of a new approach to measurement", *Journal of Health Economics*, 22(1), pp. 61-87.