HEALTH AND ITS EFFECTS ON THE QUALITY
OF LIFE IN THE EU COUNTRIES

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Abstract

The aim of the paper is to analyse health and its influence on quality of life in the EU countries. One of actually discussed topics in quality of life measurement is health. This paper assesses importance of health in determining the quality of life. First research goal tries to explore relationship between indicators of objective and self-perceived health status to find out means of their usage in the context of quality of life. Next goal is focused on influence of health satisfaction on overall life satisfaction. Final research goal tries to explain relationship between health of population and overall life satisfaction. Main contribution of the paper is to demonstrate differences between objective and self-perceived health and to point out the fact that overall life satisfaction is shaped by various dimensions of life.

Keywords: health, life satisfaction, quality of life, self-perceived health

JEL classification: C38, C51, I10, I31

1. INTRODUCTION

At present, there is an extensive research and discussion about quality of life (QOL) on national and individual level. There is no unified definition of QOL nor unified of methodology of its measurement. QOL reflects the difference between the hopes and expectations of the individual and the individual's present experience (Fayers and Machin, 2000). QOL is for many scientists complex, multidimensional concept, for which there is no uniform definition (Das, 2008; Ira and Andráško, 2007; Gavurová *et al.*, 2014). QOL issues are intermingling with many disciplines from economics, theology, psychology, medicine, up to geography. Therefore, it is important to define the area of QOL and suitable choice of indicators (Murgaš, 2009). Veenhoven (2006, p. 2) describes difference between objective and subjective QOL. In his view, objective QOL refers to the level of satisfaction and explicit standards of the good life as assessed by an impartial outsider, e.g. the availability of services, the average wage, quality of the natural environment, etc. Subjective QOL, according to him, concerns self-appraisals based on implicit criteria, e.g. someone's

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subjective feeling of health. These two qualities do not automatically correspond. A person may be in good health by the criteria of his doctor; however his subjective feeling is poor.

Health is a fundamental human right of all people in the world, referred in the United Nations Universal Declaration of Human Rights (1948). World Health Organisation (WHO, 1948) defines health as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity". Deaton (2008) considers evaluations of income and health as the most important determinants in assessment of QOL. Furthermore, Stiglitz *et al.* (2009) consider health as the most fundamental dimension of QOL, because without health, none of the other dimension has any value. Problems with health (physical or mental) influence QOL and can shorten length of life (Eurostat, 2015b). Our paper focuses on health as the third dimension of QOL, recommended by Eurostat, because it can highly influence economic and social development through human capital of a society. Furthermore, healthy life is also a sign of societal well-being (Eurostat, 2015b).

The paper attempts to answer the main investigation question about influence of health on QOL in the EU countries.

The partial research objectives of this paper are:
• to answer the question whether indicators of objective and self-perceived health status substitute each other,
• to explore influence of satisfaction with health on overall life satisfaction,
• to examine the relationship between indicators of objective and self-perceived health status and overall life satisfaction of people in the EU countries.

In order to meet the research objectives, the paper is divided into several parts. Theoretical framework contains brief overview of the QOL concept, health indicators and related literature. The next part is dedicated to description of our data and used methodology. In findings, we discuss our results obtained from research. Finally we conclude and evaluate research objectives.

The main contribution of the paper is assessment of health as one of many dimensions of QOL and its influence on overall life satisfaction. Our results confirm positive influence of health on overall life satisfaction among EU citizens and its diminishing significance in countries with higher level of economic development by the means of linear regression model.

2. THEORETICAL FRAMEWORK

2.1. QOL and health

Besides the QOL term, there are numerous related terms that are often used as synonyms, although their meaning is not yet precisely defined, e.g. life satisfaction, happiness, subjective well-being, well-being, etc. Diener (2005, pp. 2-3) defines subjective well-being as all of the various types of evaluations, both positive and negative, that people make of their lives. Life satisfaction represents a respondent's evaluation of his/her life taken as a whole. He describes also domain satisfactions as judgments that people make in evaluating major life domains, such as health, job, leisure time, social relationships, and family. Veenhoven (1996, p. 14) specifies happiness as a person's overall evaluation of his/her life as a whole. In the field of sociology, Heřmanová (2012) defines QOL as a reflection of objective environmental, social and spatial (geographic) systems in relation to individual motivation, skills, goals and expectations. WHO (1997, p. 1) states QOL as individuals' perception of their position in life

in the context of the culture and value systems in which they live, and in relation to their goals, expectations, standards and concerns.

Stiglitz *et al.* (2009, p. 145) in the report on the Measurement of Economic Performance and Social Progress characterise three main conceptual approaches in QOL measurement. The first is based on the concept of subjective well-being, the second on the capabilities and the last on welfare economics and theory of fair allocations. Even though there are differences between these concepts, they all have a part in QOL measurement.

QOL indicators should be understood through a multidimensional framework as proposed in the Stiglitz *et al.* (2009). Eurostat Report of the Task Force (Eurostat, 2011) recommends the development of multidimensional indicators of QOL. This report, through the results of the working group, reviews the existing indicators, the methodology and various recommendations in the selection of indicators. Multidimensional measurement of QOL focuses on the 9 approved dimensions, namely: material living conditions (income, wealth and consumption), health, education, productive and valued activities (including work), governance and basic rights, leisure and social interactions, natural and living environment, economic and physical safety and overall experience of life. Nováková (2014) in her paper provides a current view on the issue of measuring QOL, with focus on the objective QOL and review of thirty aggregate indices which reflect the total or partial aspects of objective QOL.

Havasi (2013) explored relationship between indicators of objective and subjective financial situation and connections between financial situation and overall feeling of happiness. Correlation analysis showed only week linkages among different types of indicators. He also found that share of happy people within different income categories increase with higher income level, but with a diminishing rate.

A significant part of the research is focused on area of health-related QOL (HRQOL) (Bowling, 2005; Moons, 2004; Sullivan, 1992). According to WHO (1997, p. 1) definition of health measurement and its impact on health care should concern not only changes in morbidity but also measurement of well-being. This can be achieved by measurement of improvement in QOL related to health and health care. WHO developed two instruments for measurement of QOL (the WHOQOL-100 and the WHOQOL-BREF) that can be used in various cultural conditions. This instrument consists of 26 items which measure areas such as physical health, mental health, social relationships and environment. Centers for Disease Control and Prevention (2012) define HRQOL as a broad multidimensional concept that usually includes self-reported measures of physical and mental health. HRQOL is primarily related to the areas which are influenced by health care providers and health care systems. It can be measured by direct interview with patients or indirectly through various generic tools, e.g. Short form (SF)-36, WHOQOL, etc.

2.2. Indicators of health

Health of the population is a determinant which can highly influence economic and social development of country through human capital. Furthermore, expenditures on health represent a substantial part of private and public resources in Europe. (Eurostat, 2015b; Šoltés and Gavurová, 2013; Szczygiel *et al.*, 2015). Consequently, in each country there is an effort to protect, monitor, and in particular to improve the health status of population by applying appropriate tools of health policy (Šoltés and Gavurová, 2014; Michalski, 2014; Raisova *et al.*, 2014). To meet these goals, it is important to know how to measure health

status. It is quite difficult because the concept of health includes both objective and subjective perception of health (Ferriss, 2010).

Eurostat recommends using objective and also subjective indicators to complement the assessment of certain dimension because both are important in the context of QOL (Diener, 2005; Stiglitz *et al.*, 2009; Eurostat, 2011) and they together determine the overall QOL (Allardt, 1986).

Objective indicators are well-measured and do not comprise self-assessed health. They include the study of morbidity referring to the prevalence of sickness and disability that characterises population, and the study of mortality relating to the level of death that specifies population (Van den Berg and Lindeboom, 2014; Gavurová and Vagašová, 2014). Different causes of death explain differences in mortality rates that are closely related to the variable "life expectancy at birth". Pol and Thomas (2013, p. 118) define life expectancy at birth as "the average number of years a hypothetical group born today could be expected to live if current age specific death rates remain constant throughout their lifetimes". Other studies reflect indicator "healthy life years" which combine life expectancy and morbidity data to produce figures for life years lost due to a variety of conditions, such as long-standing disabilities (Hyder *et al.*, 1998). In other words, it is disability-free life expectancy.

OECD (2013, 2014) regularly issues a publication "Health at a Glance" containing actual values of health indicators. Life expectancy at birth in the EU countries over the period 2004-2012 increased from 75.2 to 77.5 years for men and from 81.5 to 83.1 years for women. When comparing healthy life years at birth in the EU, the average value of years was 62.3 for women and 61.3 for men in 2012. The highest level (above 70 years) was found in Sweden and Malta, and on the other hand, the lowest values of healthy life years (circa 53 years) were in Estonia, Slovak Republic, and Latvia for men. For women, the lowest values were in Slovenia and in Slovak Republic.

Considering the subjective measurement of health status, many studies include the self-perceived health in regard to the specific disease, such as hypertension (Johnston *et al.*, 2007), diabetes mellitus (Naess *et al.*, 2005), cancer, stroke (Kowal *et al.*, 2012), etc. Information about satisfaction with health as a whole is gathered by surveys (Eurofound, 2012) in which the respondents are asked the questions about their health mostly on the 5 or 10 point scale (ordered from the best evaluation to the worst). These results are mostly evaluated within demographic characteristics like age, sex, race or income and educational level of respondents.

Eurofound (2012) carried out 3rd European Quality of Life Survey, in which one of the questions was: How satisfied you are with your health? On the scale from 1 - very dissatisfied to 10 - very satisfied, the average score was 7.3, the best score was recorded in Cyprus (8.4), and on the other hand the worst score was recorded in Latvia (6.6). Higher proportion of Europeans considers their general health as good or very good (64%), whereas less Europeans consider their health as bad and very bad (9%). Based on this literature we decided to assess health as the important dimension of QOL.

3. DATA AND METHODOLOGY

For our analysis we used data from Eurostat, specifically from module EU-SILC in the EU-28 for the year 2012 (Eurostat, 2015b). Indicators measuring objective and self-perceived health status of population are the following:

- Life expectancy at birth (LEaB): Data are expressed in years.

- Healthy life years (HLY): Data are averaged for both sexes in each country, and they are expressed in years.

- Self-perceived health (SPH): The questionnaire asks how a person perceives his/her health in general. The respondents can mark one of the answer categories very good/ good/ fair/ bad/ very bad. For this indicator we made index which was calculated as weighted average. Weights are ordered from 1 ´very bad´ to 5 ´very good´. Higher values of index refer to better self-perceived health in population.

- Self-perceived long-standing limitations in usual activities due to health problem (SPLSL): The respondents denote their limitations in activities of daily living due to one or more health problems that lasted at least for the past six months. They can choose from three answers: severely limited/ limited but not severely/ not limited at all. For this indicator we made index which is calculated as weighted average. Weights are ordered from 1-severe to 3-none. Higher values of index refer to smaller long-standing limitations in usual activities due to health problems in population.

Another source of data for our analysis with focus on life satisfaction was Eurofound (2015). It includes the results of all surveys on QOL for EU citizens, namely European Quality of Life Surveys (EQOLS). For regression analysis we used data from 3rd EQOLS conducted in 2011- 2012 which was obtained individually for each citizen who replied to the questionnaire (available through the UK Data Service). Data in aggregate form for each country is available in interactive database on the website of Eurofound. Specifically, we worked with available data for the EU-28 obtained from EQOLS questionnaire about: age and satisfaction with different dimensions of life (education, present standard of living, accommodation, family life, health, social life, economic situation in country and overall life satisfaction).

We worked with data from the year 2012 to make our analysis comparable with data from EQOLS which is the latest European QOL survey. We use ISO codes of the EU-28 countries, namely: AUT-Austria; BEL-Belgium, BGR-Bulgaria, CYP-Cyprus, CZE-Czech Republic, DEU-Germany, DNK-Denmark, EST-Estonia, GRC-Greece, ESP-Spain, FIN-Finland, FRA-France, HRV-Croatia, HUN-Hungary, IRL-Ireland, ITA-Italy, LTU-Lithuania, LUX-Luxemburg, LVA-Latvia, MLT-Malta, NLD-Netherlands, POL-Poland, PRT-Portugal, ROM-Romania, SWE-Sweden, SVN-Slovenia, SVK-Slovakia, GRB-United Kingdom. The Czech Republic, Hungary, Poland and Slovakia are countries from The Visegrad group (V4). Baltic countries are Latvia, Lithuania and Estonia.

The intensity of the dependence was evaluated by the means of the Pearson correlation coefficient to meet the first research objective about relationship between health indicators which represents objective and self-perceived health status. MS Excel was used for statistical purposes.

Before the cluster analysis, we transformed data on individual indicators (variables) into a consistent scale (0, 1) according to the next formula based on (Huba *et al.*, 2003):

$$I_{xi} = (\max x_i - x_i)/(\max x_i - \min x_i) \tag{1}$$

if desirable development is increasing with max x_i, and

$$I_{xi} = (x_i - \min x_i)/(\max x_i - \min x_i) \tag{2}$$

if desirable development is increasing with min x_i, where x_i is value representing the performance value of the certain indicator and Ix_i is normalised value of a certain indicator for *i-th* country.

To form group of the EU-28 countries with similar characteristics focusing on subjective perception of citizens about their health, we decided to make cluster analysis, specifically, hierarchical (tree) clustering based on Ward's method. The results from this analysis are displayed as a tree diagram called a dendrogram which shows groups of similar countries calculated from Euclidean distances between the objects. Calculations were made in statistical software *R* by using packages: *mclust*, *NbClust* and *cluster*.

To explore influence of satisfaction with health on overall life satisfaction, we calculated linear regression models. Influence of different variables on dependent variable was explored by the means of linear regression model in various studies (e.g. Deaton, 2008; Saksonova and Vilerts, 2015). Linear regression model was estimated as an OLS regression by the means of the next formula:

$$Y = \beta_0 + \beta_1 X_1 + ...\beta_n X_n + \varepsilon \tag{3}$$

where:

- Y is the dependent variable - satisfaction with life as a whole, defined on the scale from 1 to 10 which refers from very dissatisfied to very satisfied;
- β_0 is the intercept term;
- X_i is a vector which consists of various variables that affect satisfaction with life, partial satisfactions with different life domains on the scale from 1 to 10;
- β_n are the n coefficients for independent variables, the vector of coefficients shows the impact of the previously mentioned variables on overall life satisfaction;
- ε is the error term.

4. FINDINGS

4.1. Indicators measuring health

Firstly, we carried out the analysis of objective health level and self-perception about health of the EU citizens. Figure no. 1 suggests that countries with higher life expectancy at birth consider their self-perceived health better. From the figure, we can see two groups of countries from which those with higher level of economic development have higher life expectancy at birth (e.g. Austria, Netherland, Sweden). The V4 (The Czech Republic, Hungary, Poland and Slovakia), Baltic countries (Latvia, Lithuania and Estonia), Bulgaria and Croatia form the second group which is characterised by lower level of life expectancy at birth relating to lower level of self-perceived health. There are also some exceptions from the main tendency, e.g. Romanian people perception of health is much better than objective health status in contrary to Portugal where people are more deprived about their health than other countries with the same level of life expectancy at birth.
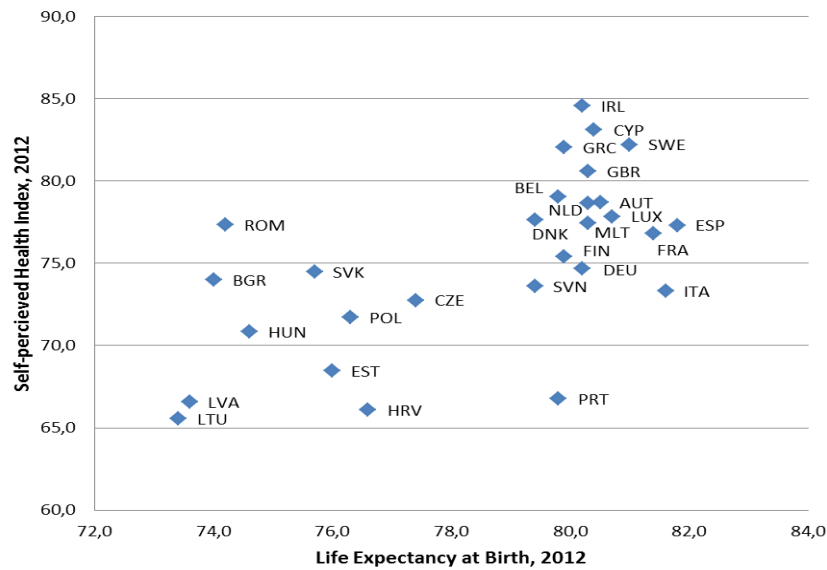
Figure no. 1 – Relationship between Life Expectancy at Birth and Self-perceived Health Index

We explored the correlation between all indicators of health described in methodology part. As we have expected, all correlations are positive, but their strength is not high. The highest correlation (0.622) is between life expectancy at birth and self-perceived health. Cohen (1988) defines correlation above 0.5 as a high strength. Higher life expectancy in each country is positively correlated with level of self-perceived health. It can be due to the fact that wealthier countries with better life conditions have higher life expectancy at birth, therefore less premature deaths are expected, as well as lower level of morbidity and better self-perceived health (Gay *et al.*, 2011). Correlation findings between other indicators varied from 0.12 to 0.372 what indicates from weak to medium strength of correlation. These findings refer to the need of considering both indicators of objective and self-perceived health. The results from correlation analysis are shown in Table no. 1.

Table no. 1 – Correlations between different types of indicators of objective and self-perceived health

	LEaB	**HLY**	**SPLSL**	**SPH**
LEaB	1			
HLY	0.28	1		
SPLSL	0.11	0.29	1	
SPH	0.62	0.35	0.37	1

The results from hierarchical clustering for all health indicators are represented in the Figure no. 2. Cluster analysis requires the specification of the optimal number of clusters to extract. We used a plot of the within groups sum of squares by number of clusters extracted. Further, we ran cluster analysis in statistical software R with 3 clusters.

Cluster Dendrogram
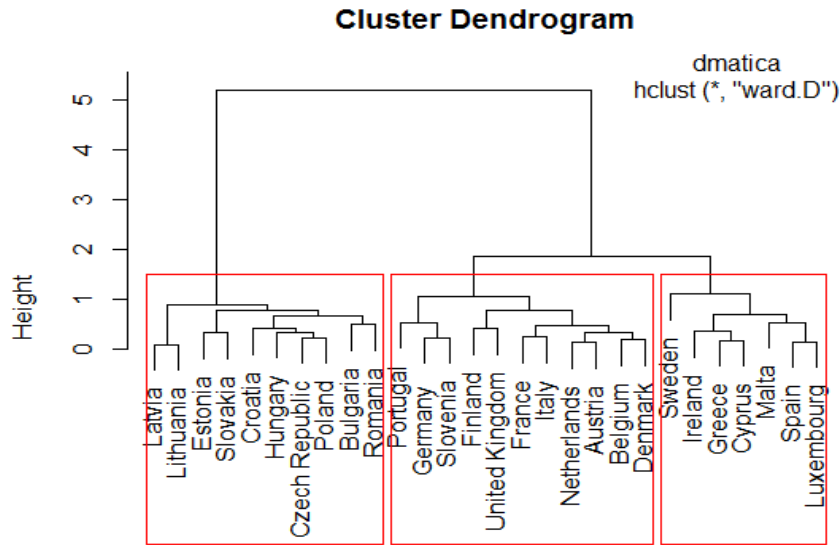
Source: own calculations in R

Figure no. 2 – Hierarchical clustering in EU countries, health indicators, 2012

1. Cluster: Latvia, Lithuania, Estonia (Baltic countries); Slovakia, Hungary, Czech Republic and Poland (the V4); Croatia, Bulgaria and Romania.
2. Cluster: Portugal, France, Italy, Germany, Slovenia, Finland, United Kingdom, Netherlands, Austria, Belgium and Denmark.
3. Cluster: Sweden, Ireland, Greece, Cyprus, Malta, Spain and Luxemburg.

Table no. 2 – Descriptive statistics of clusters

		1. Cluster	2. Cluster	3. Cluster
Mean	LEaB	75.2	80.2	80.6
	HLY	61.3	61.7	62.7
	SPLSL	88.9	87.6	92.0
	SPH	70.8	75.9	80.7
Standard Deviation	LEaB	1,4	0,7	0,6
	HLY	0.7	1.4	2.2
	SPLSL	2.1	1.7	2.1
	SPH	4.0	3.9	3.0
Min	LEaB	73.4	79.4	79.9
	HLY	59.8	60.3	61.5
	SPLSL	85.6	85.0	89.1
	SPH	65.5	66.8	77.3
Max	LEaB	77.4	81.6	81.8
	HLY	61.9	64.6	67.6
	SPLSL	92.7	90.3	95.7
	SPH	77.4	80.6	84.6

Source: own calculations in MS Excel

As we can see from the Table no. 2, **the first cluster** includes countries with the worst values of selected health indicators. This cluster has the lowest values of objective health status indicators (LEaB, HLY). On the other hand, standard deviation of self-perceived health status indicators (SPLSL, SPH) is the highest, and that reflects higher differences in self-perception of health in this cluster. The mean value of LEaB (75.2) is lower when comparing to other two clusters (80.2; 80.6). HLY also performs the lowest value, on the other hand, its standard deviation is the lowest, and that means that there is no large difference between countries. SPH states the highest value of standard deviation from all health indicators (4.0), as is seen in the first cluster. That reflects the largest discrepancies in self-perception of health in these countries. Minimum value of SPH is 65.5, while maximum value is 77.4.

The V4 and Baltic countries abandoned the path of building socialism under the leadership of the Communist party and went to the transitive phase in the early 90s of the 20th century. Former Eastern bloc countries achieved significantly worse health outcomes, probably due to the worse environment, neglected investment and poor organisation of the health care system. A common feature of the former Eastern bloc countries was also publicly funded health care system which reduced the motivation of people to invest in their health. For these countries is typical low effectiveness of using resources, out of date information and communication technologies and corruption (*Gavurová et al., 2014*).

The second and third clusters have better average values of health indicators when comparing to the first cluster. This is especially visible in indicators LEaB and SPH. Analysis of SPLSL indicator reveals that the second cluster has the lower value (87.6) of the indicator comparing to the first cluster (88.9), while the third cluster states the best value of all (92.0). These findings are interesting in the view of our assumption that last two clusters should be more similar. Moreover, standard deviation of the third cluster is identical to the first cluster (2.1). We can again highlight the unexpected similarity.

4.2. Health and QOL

This part aims to explore influence of partial satisfaction with health on overall life satisfaction. We take subjective perception of QOL as the main indicator. In the EQOLS, subjective perception of QOL is measured by a question about evaluating the satisfaction with life as a whole. The Eurofound questionnaire includes the scale from 1 to 10 which refers from very dissatisfied to very satisfied. In the Figure no. 3, we can see three groups of people. The first group of dissatisfied people denoted their satisfaction with life from 1 to 3, the second group of satisfied people from 4 to 6, and the last group of very satisfied people from 7 to 10. In each group there are people who are satisfied with their health from 1 to 10 (ranging from very dissatisfied to very satisfied).

We can point out the tendency that in the group of dissatisfied people there is approximately similar number of people in each category of health satisfaction. The number of people who marked 1 is approximately the same as the number of people who marked 10. This can be due to fact that partial satisfaction with health has only little influence on the most deprived people. On the other hand, in groups of satisfied and very satisfied people, there is tendency of increasing partial health satisfaction with overall life satisfaction. It suggests that health is not deciding determinant in shaping overall life satisfaction. This observation complies with the findings of Bem and Michalski (2014).
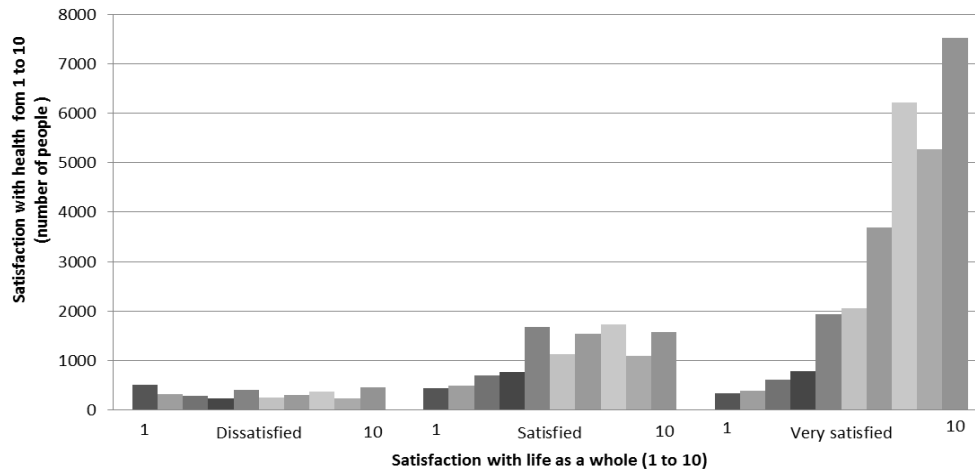
Source: own processing based on data from Eurofound

Figure no. 3 – Number of people satisfied with their health within groups of people based on their overall satisfaction with life, 2012

Further, we compare this finding with the results of three linear regression models in which dependent variable is satisfaction with life as a whole and 9 independent variables are: age (measured in years), satisfaction with various domains of life (scored from 1 to 10) (see Table no. 3).

Table no. 3 – Linear regression models of life satisfaction (EQOLS, 2012)

|	Model 1	Model 2	Model 3
Age	-0.001149	0.0046513***	0.005865***
Satisfaction with education	0.009367	-0.0015854	0.027429**
Satisfaction with present standard of living	0.380967***	0.3301642***	0.320489***
Satisfaction with accommodation	0.018581*	0.0208020*	0.029260*
Satisfaction with family life	0.104573***	0.1514843***	0.141632***
Satisfaction with health	0.094566***	0.0922850***	0.045653***
Satisfaction with social life	0.071127***	0.1592711***	0.130514***
Satisfaction with economic situation	0.091385***	0.0534836***	0.089067***
Adjusted R^2	0.3997	0.3941	0.3497
Number of observations	11 042	16 164	7 250

Note: Significant codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1.
Source: own calculations in R

We calculated three linear regression models for every cluster of countries from the previous cluster analysis to explore the differences between clusters. All three models show the significant influence almost in all different life dimensions on overall life satisfaction, except for satisfaction with education in the first and the second model. When we focus on the satisfaction with health, the highest value of estimator (0.094566) is observed in the first cluster of economically less developed countries. In the second cluster of countries the value of estimator decreases slightly (0.0922850), and the third cluster of countries reports the lowest value of estimator (0.045653), although still with positive significance. This analysis

confirms that partial satisfaction with life has the highest effect on overall life satisfaction in the first cluster of economically less developed countries and the lowest effect in the third cluster of countries with the higher level of economic development. This finding is based on the values of estimators.

When we consider various partial dimensions of QOL in all models, the highest positive effect is recognised in "Satisfaction with present standard of living", then "Satisfaction with family life and with social life", and finally "Satisfaction with health" which appears to be less important compared to them. This can point out that overall life satisfaction is shaped by various life domains and that partial satisfaction with health is on the third place from all independent variables in our models. However, in our analysis, we considered only limited number of selected variables. In real life, QOL and overall life satisfaction are influenced by more determinants and life circumstances (Veenhoven, 2006).
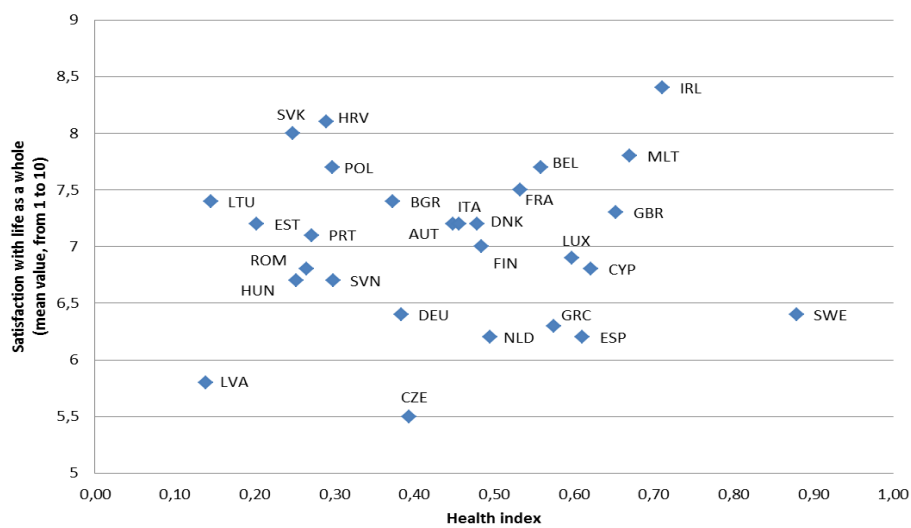
Source: own processing based on data from Eurofound
Figure no. 4 – Relationship between Health index and Satisfaction with life as a whole in the EU countries, 2012

Further, we calculated health index as average value of all used health indicators, namely LEaB, HLY, SPLSL and SPH. Figure no. 4 reflects on relationship between health index and subjective perception of overall life satisfaction. Value of correlation coefficient is nearly 0 which indicates no relationship between health index and overall life satisfaction in the EU countries. This finding does not confirm our expectation about positive relationship between health of population and overall satisfaction with life.

5. CONCLUSIONS

The paper aims to assess health as the important dimension of QOL and its effect on overall life satisfaction in the EU countries. Firstly, we ran cluster analysis which identified three clusters of countries based on level of health indicators. We used these groups of countries for further analysis.

Our first question about relationship between indicators of objective and self-perceived health status is only partially confirmed by results of correlation analysis. All correlations are positive, but the high correlation is only in one case. Other indicators are only weak correlated, so we can assume that indicators of both objective and self-perceived health status are important when assessing health of population, and they should not be used alternatively. Influence of satisfaction with health on overall life satisfaction is the subject of second research objective. Our results confirm significant positive influence. We found that in economically less developed countries of the first cluster there is the highest influence of health satisfaction on overall life satisfaction, compared to the other two clusters. Satisfaction with health is also less important in the group of dissatisfied people. Furthermore, impact of partial health satisfaction on overall life satisfaction is not the highest from all considered partial life satisfactions. In contrast to our expectations, we did not find the relationship between calculated health index and overall life satisfaction of people in the EU countries. This can be due to the simplification and limited number of indicators in health index.

Our research was limited by several factors that may be addressed in the future. Firstly, the sample period of 3rd EQOLS (2011-2012) is rather short due to publically unavailable data. However, we decided to work with the latest data from the area of QOL because time analysis is not the aim of the paper. In case of considering longer and more consistent time series, time development analysis of health status and satisfaction trends would be vulnerable in creating the policy recommendations. Moreover, consideration of higher number of indicators and analysis of differences between various demographic groups and country regions could provide more detailed and relevant insight on QOL issues. Consequently, better policy recommendations to improve health status of population can increase QOL in the countries and regions. Further, for our analysis we used simple technique of linear regression modelling which can be helpful in same context. On the other hand, findings from research could be enhanced by the means of more advanced and sophisticated econometric methods which can take into consideration more factors of life satisfaction and provide more relevant findings, e.g. multinomial logistic regression, etc.

Despite some above mentioned limitations, our paper brings beneficial results in the field of QOL which can serve for the future research.

References

Allardt, E., 1986. Having, Loving, Being: An alternative to the Swedish model of welfare research. In M. Nussbaum and A. Sen (Eds.), *The Quality of Life* (pp. 88-95). Oxford: Clarendon Press.
Bem, A., and Michalski, G., 2014. The financial health of hospitals. V4 countries case. In E. Ľapinová and J. Gubalová (Eds.), *Zborník vedeckých štúdií* (pp. 1-9): Univerzity Mateja Bela v Banskej Bystrici.
Bowling, A., 2005. *Measuring health: a review of quality of life measurement scales* (3 ed.). Berkshire: UK Open University Press.

Centers for Disease Control and Prevention, 2012. Health-Related Quality of Life (HRQOL). Retrieved 11 April 2015, from http://www.cdc.gov/hrqol/

Cohen, J., 1988. *Statistical Power Analysis for the Behavioral Sciencies*. New Jersey: Lawrence Erlbaum Associates.

Das, D., 2008. Urban quality of life: A case study of Guwahati. *Social Indicators Research, 88*(2), 297-310. doi: http://dx.doi.org/10.1007/s11205-007-9191-6

Deaton, A., 2008. Income, Health, and Well-Being around the World: Evidence from the Gallup World Poll. *Journal of Economic Perspectives, 22*(2), 53-72. doi: http://dx.doi.org/10.1257/jep.22.2.53

Diener, E., 2005. Guidelines for National Indicators of Subjective Well-Being and Ill-Being. Retrieved 14 April 2015, from http://internal.psychology.illinois.edu/~ediener/Documents/Guidelines_for_National_Indicators.pdf

Eurofound, 2012. *Third European Quality of Life Survey - Quality of life in Europe: Impacts of the crisis* doi:10.2806/43151

Eurofound, 2015. European Quality of Life Surveys. Retrieved 1 March 2015, from http://www.eurofound.europa.eu/european-quality-of-life-surveys-eqls

Eurostat, 2011. Report of the Task Force: Multidimensional measurement of the quality of life.

Eurostat, 2015a. European Statistics on Income and Living Conditions. Retrieved 1 March 2015 http://ec.europa.eu/eurostat/data/database

Eurostat, 2015b. Quality of life indicators. Retrieved 29 March 2015, from http://ec.europa.eu/eurostat/statistics-explained/index.php?title=Quality_of_life_indicators&oldid=226183

Fayers, P. M., and Machin, D., 2000. *Quality of life. Assessment, analysis and interpretation*. Chichester: John Wiley & Sons, Ltd.

Ferriss, A. L., 2010. *Approaches to Improving the Quality of Life. How to Enhance the Quality of Life*. Dordrecht: Springer Netherlands.

Gavurová, B., Stefko, R., and Bacik, R., 2014. The Analysis of Social Services' Structure in a Specific Region and its Significance for Health and Social Policy in Slovakia. *Polish Journal of Management Studies, 10*(2), 43-53.

Gavurová, B., and Vagašová, T., 2014. Meranie efektívnosti zdravotnej starostlivosti v krajinách EÚ konceptom liečiteľnej úmrtnosti. *Exclusive journal, 2*(3), 50-62.

Gay, J. G., Paris, V., Devaux, M., and Looper, M., 2011. *Mortality Amenable to Health Care in 31 OECD Countries: Estimates and Methodological Issues,* OECD Health Working Papers, doi:http://dx.doi.org/10.1787/5kgj35f9f8s2-en

Havasi, V., 2013. Financial Situation and Its Consequences on the Quality of Life in the EU Countries. *Social Indicators Research, 113*(1), 17-35. doi: http://dx.doi.org/10.1007/s11205-011-9901-y

Heřmanová, E., 2012. *Koncepty, teorie a měření kvality života*. Praha: Sociologické nakladatelství (SLON).

Huba, M., Ira, V., Hanusin, J., Lehotsky, M., and Szollos, J., 2003. Regional aspects of development towards sustainable Slovakia. *Ekologia (Bratislava), 22*(2), 66-78.

Hyder, A. A., Rotilant, G., and Morrow, R. H., 1998. Measuring the burden of disease: healthy life-years. *American Journal of Public Health, 88*(2), 196-202. doi: http://dx.doi.org/10.2105/AJPH.88.2.196

Ira, V., and Andráško, I., 2007. Quality of life in the perspective of human geography. *Geograficky Casopis, 59*(2), 159-179.

Johnston, D. W., Propper, C., and Shield, M. A., 2007. Comparing Subjective and Objective Measures of Health: Evidence from Hypertension for the Income/Health Gradient. Retrieved 11 April 2015, from http://ftp.iza.org/dp2737.pdf

Kowal, J., Wilson, K. G., McWilliams, L. A., Peloquin, K., and Duong, D., 2012. Self-perceived burden in chronic pain: Relevance, prevalence, and predictors. *Pain, 153*(8), 1735-1741. doi: http://dx.doi.org/10.1016/j.pain.2012.05.009

Michalski, G., 2014. Value maximizing corporate current assets and cash management in relation to risk sensitivity: Polish firms case. *Economic Computation and Economic Cybernetics Studies and Research, 48*(1), 259-276.

Moons, P., 2004. Why call it health-related quality of life when you mean perceived health status? *European Journal of Cardiovascular Nursing, 3*(4), 275-277. doi: http://dx.doi.org/10.1016/j.ejcnurse.2004.09.004

Murgaš, F., 2009. Quality of life and its spatial differentiation in districts of Slovakia. *The Geographical Journal, 61*(2), 121-138.

Naess, S., Eriksen, J., Midthjell, K., and Tambs, K., 2005. Subjective well-being before and after the onset of diabetes mellitus: Results of the Nord-Trondelag Health Study. *Journal of Diabetes and Its Complications, 19*(2), 88-95. doi: http://dx.doi.org/10.1016/j.jdiacomp.2004.05.003

Nováková, B., 2014. Meranie objektívnej kvality života. In P. Pudło and L. Pčolinská (Eds.), *Transfer znalostí v oblasti ekonomicko-manažérskych disciplín: Inovačné tendencie, ich význam, potreba a interdisciplinárny transfer: recenzovaný nekonferenčný odborný zborník* (pp. 41-51). Bratislava: Ekonóm.

OECD, 2013. *Health at a Glance 2013: OECD Indicators*. Paris: OECD Publishing.

OECD/European Union, 2014. *Health at a Glance: Europe 2014*. Paris: OECD Publishing.

Pol, L. G., and Thomas, R. K., 2013. *The Demography of Health and Healthcare* (3 ed.). Dordrecht: Springer Science Business Media.

Raisova, M., Buleca, J., and Michalski, G., 2014. Food Processing Firms Inventory Levels in Hard Times. 2004–2012 Slovak, Czech and Polish Enterprises Case. *Procedia Economics and Finance, 12*, 557-564. doi: http://dx.doi.org/10.1016/S2212-5671(14)00379-7

Saksonova, S., and Vilerts, K., 2015. Measuring returns to education: The case of Latvia. *Scientific Annals of the "Alexandru Ioan Cuza" University of Iasi, Economic Sciences, 62*(2), 252-262. doi: http://dx.doi.org/10.1515/aicue-2015-0017

Šoltés, V., and Gavurová, B., 2013. Application of the cross impact matrix method in problematic phases of the Balanced Scorecard system in private and public sector. *Journal of Applied Economic Sciences, VIII*(1), 99-119.

Šoltés, V., and Gavurová, B., 2014. Analysis of Selected Demographic Aspects of Day Surgery in Slovak Health Policy. *Journal of Applied Economic Sciences, 9*(3(29)), 476-486.

Stiglitz, J. E., Sen, A., and Fitoussi, J. P., 2009. Report of the Commission on the Measurement of Economic Performance and Social Progress. Paris.

Sullivan, M., 1992. Quality of life assessment in medicine. *Nordic Journal of Psychiatry, 46*(2), 79-83. doi: http://dx.doi.org/10.3109/08039489209103305

Szczygiel, N., Rutkowska-Podolowska, M., and Michalski, G., 2015. Information and Communication Technologies in Healthcare: Still Innovation or Reality? Innovative and Entrepreneurial Value - creating Approach in Healthcare Management. In P. Nijkamp, K. Kourtit, M. Buček and O. Hudec (Eds.), *5th Central European Conference in Regional Science Conference Proceedings* (pp. 1020-1029). Košice, Slovakia: Technical University of Košice.

United Nations, 1948. United Nations Universal Declaration of Human Rights 1948. Retrieved 15 March 2015, from http://www.supremecourt.ge/files/upload-file/pdf/act3.pdf

Van den Berg, G. J., and Lindeboom, M., 2014. Aging health at advanced ages. In A. J. Culyer (Ed.), *Encyclopedia of health economics* (pp. 56-61). Oxford: Elsevier.

Veenhoven, R., 1996. The study of life satisfaction. In W. E. Saris, R. Veenhoven, A. C. Scherpenzeel and B. Bunting (Eds.), *A comparative study of satisfaction with life in Europe* (pp. 11-48). Budapest, Hungary: Eötvös University Press.

Veenhoven, R., 2006. The four qualities of life: Ordering concepts and measures of the good life. In M. McGillivray and M. Clark (Eds.), *Understanding Human Well-being* (pp. 74-100). Tokyo-New York -Paris: United Nations University Press.

WHO, 1948. Preamble to the Constitution of the World Health Organisation as adopted by the International Health Conference. Retrieved 15 March 2015, from http://www.who.int/about/definition/en/print.html

WHO, 1997. WHOQOL: Measuring Quality of Life. Retrieved 15 March 2015, from http://www.who.int/mental_health/media/68.pdf