AHP Model for Quality Evaluation of Healthcare System

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Abstract. The issue of healthcare quality is continuously analysed worldwide, as it is a costly investment which takes significant part of country budgets. The EU wide healthcare costs have already overcome €1,400 billion/year, and have a faster raising trend comparing to the GDP levels of member countries. The variety of models, abundance of indicators and inconsistency of statistical information used for quality evaluation in healthcare leads to numerous attempts of solving this task in the scientific literature. The article aims to evaluate healthcare quality by taking into account the importance of indicators by applying expert based AHP (Analytic Hierarchy Process) method and the regression analysis of health statistics. The rankings of EU countries according to their healthcare investment types and costs were developed and evaluated.

Keywords: Quality evaluation · Healthcare system · Analytic Hierarchy Process (AHP) · EU countries healthcare statistics

1 Introduction

The main concepts of discussion in the contemporary healthcare are related to defining the standards of quality of care, increasing efficiency of investments and exploring of cost containment problem, which could reduce healthcare costs without losing its quality.

Following the Institute of Medicine, quality of care is defined as "the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge" (Institute of Medicine 2001). Quality of healthcare includes the aspect of decision making, as it should allow individuals have their preferences met in terms of treatment options.

Quality of healthcare is evaluated according to six main dimensions (Institute of Medicine 2001):

- Effective, and improve health outcomes;
- Safe, and prevent avoidable harm related with care;
- Appropriate, and comply with current professional knowledge as well as meeting agreed standards;

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– Involve persons/patients as key partners in the process of care;
– Efficient and leading to the best value for money invested and to equal access to available care of the same level of quality for all.

The task is to investigate how quality of care can be assessed in order to validate processes, tools, treatments in healthcare systems without undermining accessibility and affordability. However, the dimensions and determinants that define quality of care have no standard format yet. Numerous indicators are evaluated by the medical organizations for characterizing the situation and dynamics of healthcare issues.

The model proposed by Donabedian (1988) is a common framework for assessing health care quality and identifies three domains in which health care quality can be assessed: structure, process, and outcomes (Shi and Singh 2015).

The research presented in this article analyses the problem of EU healthcare system performance measurement by suggesting quality/efficiency measurement framework using AHP method. The research takes into account complex interrelations of the performance criteria, which are arranged to hierarchical structure, and possibility to introduce expert judgment. The following sections discuss the importance of weighting of healthcare quality evaluation criteria and their arrangement in hierarchical structure as proposed by group of experts. The Sect. 3 analyses principles of the selected research method AHP. The last section of the paper illustrates the feasibility of the proposed methods in the area of healthcare quality/efficiency evaluation and discusses the allocation of EU countries to the most adequate segments of healthcare level.

2 Healthcare Quality Evaluation Frameworks

The concept of quality in the healthcare is developed in the comparative basis. Performers of quality evaluation create vast variety of models used for country rankings, where different input and output variables are included. This leads to even contradictory results where the same country can be is opposite ranking positions due to differences of the ranking models. Some of the ranking examples include models by Bloomberg, EU reports, USA efficiency reports and others.

The country ranking worldwide by their quality and efficiency in healthcare as proposed by Bloomberg is based on three criteria: life expectancy; relative per capita cost of health care (percentage of GDP per capita); and the absolute per capita cost of health care (expenditures covering preventive and curative services, family planning, nutrition and emergency aid). The ranking included countries with populations of at least five million, life expectancy of at least 70 years and GDP per capita of at least $5,000 (Lu and Du 2016).

The variables which indicate quality of healthcare are not standardized. Various statistical data as well as survey data are used for measuring quality of healthcare. World Health organization classifies the indicators into main groups of Health status, Risk factors, Service coverage, Health systems. The report presents 100 indicators for monitoring health status (World Health Statistics 2016). The prevailing indicators in the research works are: expected life duration at birth, expected life duration after 65 or expected duration of healthy life after 65. However these indicators reveal significant

differences of population health indicators in various countries. The EU country statistics indicate differences of life expectancy at birth from 73.7 (LT) to 82.6 (ES) (Medeiros and Schwierz 2015). The survey published in Patient safety and quality of care (2013) also reveals differences in perceived quality of healthcare by population: most all respondents in Belgium (97%), Austria (96%), and Malta and Finland (both 94%) evaluate the overall healthcare quality in their countries as good, yet only around a quarter of respondents in Romania (25%) and Greece (26%) say the same. Despite of efforts for collecting statistical data on various indicators, it is not clear which of them are responsible for healthcare status and could provide guidance where and how much has to be invested for achieving desired level of healthcare.

In our research we prefer the factors consistently measured by all EU countries, which include various statistical data or survey information of healthcare.

The first stage of the research aimed to explore interrelationship and importance of groups of indicators of different origin. We have divided the healthcare factors into 5 big groups (Fig. 1): Infrastructure, Life style, Country general statistics, Service consumption and Subjective healthcare measures.

Each group of factors which can potentially affect quality and efficiency of healthcare, and imply significant costs consist of subgroups (as in Fig. 1). There can be used many indicators for characteristics, but for each group we have limited splitting

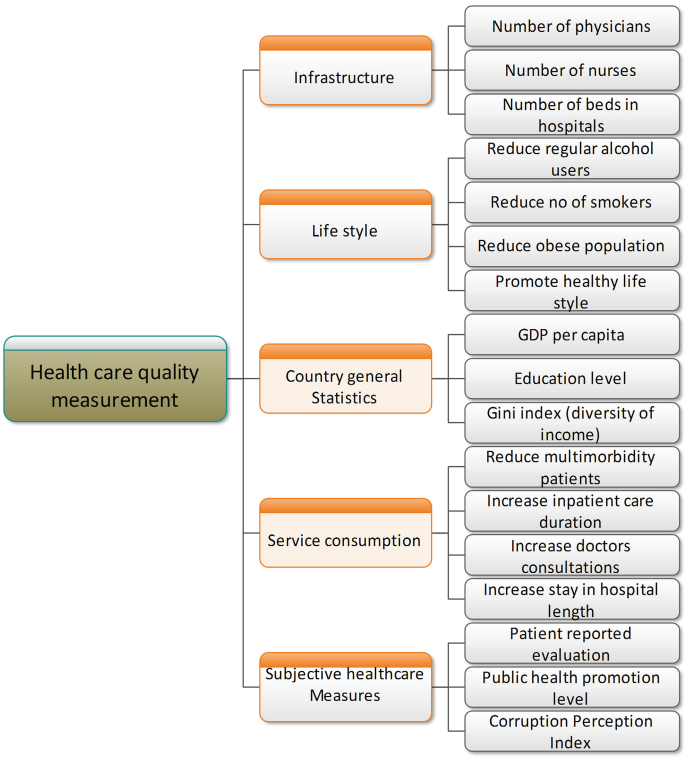

Fig. 1. Factors describing the healthcare quality

only to 3 or 4 subindicators (factors), as the further applied research method is very sensitive to big number of input variables.

The indicators falling in to the *Infrastructure* group characterize the investment of the country to main infrastructural compounds of healthcare provision, such as hiring professional physicians and nurses, general equipment of hospitals, also including number of beds for patients. EU countries have different strategies and initiatives related to these indicators which have taken place in many EU countries (Denmark, Sweden, Latvia and others), such as centralizing professional treatment to big hospitals, and reducing number of small regional healthcare institutions, reducing number of beds in hospitals, creating compensation systems for motivating nurses and doctors, increasing role of family doctors versus direct access to the specialists, etc.

The *Life style* group contains indicators which characterize general attitude to the health issues by people, also includes preventive measures and treatment priorities to risk groups. The group describes country investments to promoting healthy life style, access to healthy environment, food, and preventive activities to alcohol consumption, also concern about people which sometimes are not treated as patients who deserved medical care (e.g. obese population, smokers).

The group of *Country general statistics* provides objective economical characteristic of countries which could make impact to healthcare. As the general spending of countries to healthcare purposes make about 8–10% of GDP, the budgets in financial terms differ significantly.

The group of *Service consumption* provides indicators which show how the medical services are used by population. It includes number of direct contacts with doctors for consulting and treatment examining purposes and preventive exploration and depends of efficiency of treatment planning, assignment of treatment procedures.

The group of *Subjective healthcare measures* provides characteristics of countries as differences of patient behaviour and attitudes. It also includes indicators of patient reported healthcare, however only few EU countries collect this type of data (some these data are available in Denmark, Sweden, Estonia, however different questionnaires are used for these purposes).

For all the factors of the second level, we have applied statistical data except for *Public health promotion level* and *Corruption Perception index* which are calculated only for some countries, so we don't include this data to our calculations. The data set of all used healthcare quality variables is presented in Appendix A.

3 Principles of AHP Method

In this research we deal with the problem of evaluation healthcare quality in EU countries. We intend to rate the level of quality in different countries and try to envisage the relation between the quality and healthcare outcome variables – long and healthy life expectancy. The indicators influencing the level of healthcare were discussed and selected in Sect. 2. Now we will describe AHP (Analytic Hierarchy Process), the method suitable for quality evaluation. It enables to use both expert knowledge and the available statistical data for defining weights of the indicators.

The AHP method enables decision makers to convert complex problems into simplified hierarchical structures to find the optimal decision alternative. The method was implemented in practice for solving tasks in economic, financial, social, managerial and technical domain areas (Saaty 1980, Saaty and Kearns 1985, Crowe et al. 1998, Drake 1998, Chuang 2001, Kumar Dey 2001, Korpela et al. 2001, Banuelas and Antony 2003, Kriksciuniene et al. 2015).

The application procedure of AHP method is divided into four major steps:

1. Problem modeling and representation of indicators in the hierarchical form,
2. Valuation of weights by pairwise comparisons,
3. Weight aggregation into priority vector by using the eigenvalue method, and
4. Sensitivity analysis.

Further we will shortly describe these steps.

Problem modelling step means decomposition of complex problem into a set of indicators arranged as hierarchy structure.

The step of *valuation of weights* is performed by collecting opinions of experts. The main feature of the method is that the expert valuation of importance of all indicators (factors or criteria) is made by pairwise comparison by defining which element of the pair is more important and in which extent. The logical consistency of opinions regarding to all pairs is checked and evaluated. The results of pairwise valuation step of all factors are arranged into matrix. Let us have n criterion of one level, then the criteria ranking matrix has $n \times n$ rank, has a following representation:

$$A = \begin{pmatrix} 1 & a_{12} & \dots & a_{1n} \\ a_{21} = 1/a_{12} & 1 & \dots & a_{2n} \\ \dots & \dots & 1 & \dots \\ a_{n1} = 1/a_{1n} & a_{n2} = 1/a_{2n} & \dots & 1 \end{pmatrix}$$

Each a_{ij} is a natural number between 1 to 9 or it's reciprocal, and express the comparison level between element i and j – the larger number means more important criteria. This matrix is called the priority or comparison matrix.

The step of *weight aggregation into priority vector* can be fulfilled by applying methods described by Saaty (1980). At first each element of matrix $\boldsymbol{A}$ is normalized by the column total sum $\overline{a_{ij}} = a_{ij} / \sum_{i=1}^{n} a_{ij}$. The priority vector elements are equal to average value of each row $p_i = \frac{1}{n} \cdot \sum_{j=1}^{n} \overline{a_{ij}}$.

The sum of priority criteria vector (vector of weights ***W)*** elements is equal to one. The large value in the priority weight indicates the most important criterion.

The calculation of priority vector makes sense only if derived from consistent comparison matrixes. Comparison matrix is called perfectly consistent, if the parity $a_{ij} = a_{ik}.a_{kj}$ is valid for all comparisons. In practice this condition can be met extremely rarely, therefore the allowed deviation for consistency is set. There are several methods for consistency evaluation. As it is shown in Saaty (1980) the *consistency index* (***CI***) can be calculated by using the eigenvalue method:

$CI = \frac{\lambda_{max} - n}{n-1}$, where n is the dimension of the comparison matrix, λ_{max} - maximal eigenvalue. The *consistency ratio*, is defined by the equation $CR = \frac{CI}{RI}$, where ***RI*** is the

random index, computed as the average ***CI*** of 500 randomly filled matrices. If ***CR*** is less than 0.1 or 10%, then the matrix can be considered as having an acceptable consistency rate.

After calculating the vector of weights ***W*** for criteria and subcriteria, we need to rank alternatives. This step is performed by calculating priority vector for each decision alternative. If we have m alternatives and n different criterion, we have to calculate n priority vectors with $(m \times 1)$ dimensions each. All these vectors are combined into one *alternatives priority matrix* (ALM) with dimensions $(m \times n)$. In order to rank the alternatives across all criteria and get *alternatives global priorities vector* (***AGPV***) we should use the additive aggregation procedure, which essentially means product of the matrixes ***ALM*** and ***W***.

The weight valuation stage of AHP method by pairwise comparisons of criterion carries the biggest subjectivity and concern. The general approach for fulfilment of this stage is employing the number of domain experts and aggregation of all opinions. In our case for evaluating the healthcare level of EU countries we have invite as experts' health specialist. We distribute the pairwise comparison sheet using BPMSG AHP Online System (http://bpmsg.com/academic/ahp.php).

4 Research Results

The research attempted to look at assessment of healthcare quality problem appealing on subjective decision of healthcare experts using AHP method. As it was described in Sect. 3, AHP application should start with the problem modelling and representation of all influencing indicators in the hierarchical form. In Sect. 2 we have discussed the selection of factors stimulating the growth of healthcare quality. The hierarchical structure of these indicators was presented in Fig. 1.

	A - wrt *Health care quality measurement* - or B?			Equal	How much more?
1	◉ Infrastructure	or	○ Life style	○ 1	○ 2 ○ 3 ◉ 4 ○ 5 ○ 6 ○ 7 ○ 8 ○ 9
2	◉ Infrastructure	or	○ Country general statistics	○ 1	○ 2 ○ 3 ○ 4 ○ 5 ○ 6 ◉ 7 ○ 8 ○ 9
3	◉ Infrastructure	or	○ Service consumption	○ 1	○ 2 ○ 3 ○ 4 ◉ 5 ○ 6 ○ 7 ○ 8 ○ 9
4	◉ Infrastructure	or	○ Subjective healthcare measures	○ 1	○ 2 ○ 3 ○ 4 ○ 5 ○ 6 ○ 7 ◉ 8 ○ 9
5	◉ Life style	or	○ Country general statistics	◉ 1	○ 2 ○ 3 ○ 4 ○ 5 ○ 6 ○ 7 ○ 8 ○ 9
6	◉ Life style	or	○ Service consumption	○ 1	◉ 2 ○ 3 ○ 4 ○ 5 ○ 6 ○ 7 ○ 8 ○ 9
7	◉ Life style	or	○ Subjective healthcare measures	○ 1	○ 2 ◉ 3 ○ 4 ○ 5 ○ 6 ○ 7 ○ 8 ○ 9
8	◉ Country general statistics	or	○ Service consumption	○ 1	○ 2 ◉ 3 ○ 4 ○ 5 ○ 6 ○ 7 ○ 8 ○ 9
9	◉ Country general statistics	or	○ Subjective healthcare measures	○ 1	◉ 2 ○ 3 ○ 4 ○ 5 ○ 6 ○ 7 ○ 8 ○ 9
10	◉ Service consumption	or	○ Subjective healthcare measures	○ 1	◉ 2 ○ 3 ○ 4 ○ 5 ○ 6 ○ 7 ○ 8 ○ 9

CR = 4.4% OK

Check Consistency ◉ AHP ○ Balanced scale Submit_Priorities

Fig. 2. Example of pairwise comparison set

We have selected the indicators from the set of attributes for which we have EU statistics, as only in this situation we can apply AHP method and calculate alternatives global priorities. The dataset of selected quantitative indicators, used in the calculations is presented in Appendix A.

To establish the weights of these factors, we distribute the pairwise comparison sheet (see example in Fig. 2) to experts' using BPMSG AHP Online System. This system allows in simple way decide the importance of each pair of factors, and let to justify the consistency of answer set.

The Fig. 2 show that the example answer set is consistent with CR = 4.4%. We got 10 consistent answers sets from experts about their opinion on importance the factors

Table 1. Global priorities of healthcare factors

Level 0	Level 1	Level 2	Global priorities
Health care quality measurement	Infrastructure **30.0**%	Number of physicians	10.7%
		Number of nurses	10.0%
		Number of beds in hospitals	9.3%
	Life style **25.8**%	Reduce regular alcohol users	8.2%
		Reduce no of smokers	4.6%
		Reduce obese population	6.4%
		Promote healthy life style	6.6%
	Country general statistics **18.1**%	GDP per capita	12.0%
		Education level	2.9%
		Gini index (diversity of income)	3.2%
	Service consumption **14.0**%	Reduce multimorbidity patients	5.1%
		Increase inpatient care duration	1.8%
		Increase doctors consultations	5.5%
		Increase stay in hospital length	1.7%
	Subjective healthcare measures **12.1**%	Patient reported evaluation	4.5%
		Public health promotion level	3.8%
		Corruption Perception Index	3.8%

affecting healthcare system quality. It can be noticed that the vision on most important factors vary in rather big interval. We can assume that in different EU countries there are different insights on importance of health care factors. In Table 1, we present the aggregated results about the constructive weights of influencing factors. The weights are expressed in percent's, and called as Global Priorities values.

As we see in Table 1 the most important factor is *Infrastructure* which is expressed by number of physicians, nurses and beds in hospitals. Its influence makes 30%. The 25.8% goes to *Life Style*, as most of experts conclude importance of the individual efforts to care about own healthy living style. The high impact (18.1%) on healthcare quality has overall country development status characterized by GDP per capita, Education level, Gini index (reflecting diversity of income). The *Service consumption* factor has not so high score of 14%. Maybe this is resulting of disparity the factors

Table 2. Quality rating and ranking of EU countries

AHP method			Regression method		
	Quality rating	Rank	Quality rating	Rank	
AT	4.68	2	5.44	2	AT
BE	4.54	4	4.59	6	BE
BG	2.80	26	1.97	28	BG
CY	2.77	27	2.30	24	CY
CZ	3.99	8	4.35	7	CZ
DE	5.03	1	5.55	1	DE
DK	4.29	7	4.07	10	DK
EE	3.27	16	3.67	13	EE
EL	3.23	18	2.50	22	EL
ES	2.84	24	2.14	25	ES
FI	4.42	6	5.17	3	FI
FR	3.56	12	3.70	12	FR
HR	2.95	23	3.11	19	HR
HU	3.25	17	4.01	11	HU
IE	3.35	15	3.12	18	IE
IT	3.44	13	2.32	23	IT
LT	3.78	10	3.48	15	LT
LU	4.44	5	5.08	4	LU
LV	2.83	25	2.96	20	LV
MT	3.22	19	2.67	21	MT
NL	3.97	9	4.75	5	NL
PL	3.13	21	3.44	16	PL
PT	2.42	28	2.07	27	PT
RO	2.95	22	2.14	26	RO
SE	4.55	3	4.28	8	SE
SI	3.37	14	3.58	14	SI
SK	3.71	11	4.09	9	SK
UK	3.22	20	3.43	17	UK

rating by experts. Very similar situation is with the *Subjective healthcare measures*. The aggregated influence of this factor is set to 12.1%. In some EU countries the patient reported healthcare quality evaluation is in high importance whereas in other it's very difficult to find such valuation. Some countries has high Corruption Perception Index, others don't have any corruption in health care and don't calculate corruption index. We couldn't find any appropriate statistical data for these variables, so, in further calculations we assume that these two variables are equally distributed for all EU countries.

Using the global priority values from Table 1, and quantitative date set (Appendix A), we apply the AHP method described in Sect. 3, and calculate the healthcare quality rating (in %) from the set of picked indicators of all 28 EU countries. The results are presented in left part of Table 2. Here we can also see the overall ranking of countries.

One of the biggest challenges using AHP is to get the weights evaluation from area experts. This task takes a lot of time and expected a deep knowledge's in the subject. So we decided to try get the factor weights using multiply regression analysis and compare the obtained results. As dependent variable we select the *Total health expenditure per capita in PPP* (see in Appendix A). All other variables from this table we analyse as independent and attempted to find reliable number of significant input variables. For this task we use STATISTICA software and get the following multiple regression results (Table 3):

Table 3. Regression summary with selected relevant factors

N = 28	Regression summary for dependent variable: Total health expenditure per capita, in PPP R = ,95056350 R* = ,90357097 Adjusted R^2 = ,86296927 F(B,19) = 22,255 p < ,00000 Std. error of estimate: 256,26					
	Beta	Std. err. of Beta	B	Std. err. of B	t(19)	p-1evel
Intercept			1551,763	847,2315	1,83157	0,082742
Physicians per 100000 population	0,227461	0,075007	196,097	64,6644	3,03254	0,006849
Beds per 1000 population	0,324010	0,112032	140,139	48,4555	2,89212	0,009339
GDP per capita, in PPP	0,341560	0,100917	0,023	0,0069	3,38457	0,003111
Education	–0,273435	0,090725	–15,316	5,0817	–3,01388	0,007139
Gini	–0,344302	0,086249	–56,074	14,0467	–3,99195	0,000780
Doctors consultations (in all settings)	0,223073	0,092756	83,502	34,7208	2,40496	0,026530
Average length of stay in hospitals	–0,230098	0,089081	–107,696	41,6939	–2,58301	0,018234
Corruption Perception Index	0,575371	0.113963	26.674	5.2832	5,04877	0,000071

We can notice that regression coefficient of determination is rather high and equal 0.90. All selected variables are significant and its influence is shown in column *Beta.* It's very interesting that most important is *Corruption Perception Index. GDP per capita in PPP* and *Gini index* are of second importance row. The weights of selected

variables we adjust from column *Beta* values. The weight for rest of variables we set to 0. Using elementary mathematical operations, we have calculated the quality rating and rank of all EU countries. See the results in the right part of Table 3.

If we parallel the results of healthcare quality ratings using AHP and Regression methods, we can notice very slight differences in quality values and obtained rank of countries. We have calculated that average difference of ranks is equal to 3. This let us assume that usage the multiple regression method in factors weight evaluation is reasonable and can replace the poll of experts.

It is very interesting to estimate the relationship of healthcare quality and *Total health expenditure*. This relationship we have visualized be scatterplot graph (Fig. 3).

The results we got are very predictable – the bigger is expenditure per capita in PPP, the higher is healthcare quality of the country. The EU countries can be divided in two sets: high quality and expenditure (upper right square on Fig. 3), low quality and expenditure (lower left circle on Fig. 3). The countries like Germany, Finland, Austria, Luxembourg, Sweden have very high healthcare quality and at the same time high percent of expenditure per capita. Nevertheless the Lithuania, Czech Republic and Slovakia belongs to second group of countries with the low expenditure level, they have healthcare quality comparable with the countries enjoying higher healthcare budget.

The research show that quality of healthcare system of EU countries is in very distinct position. The 'old' EU countries allocate the considerable amount of GDP for this sector and this secure the high level of healthcare.

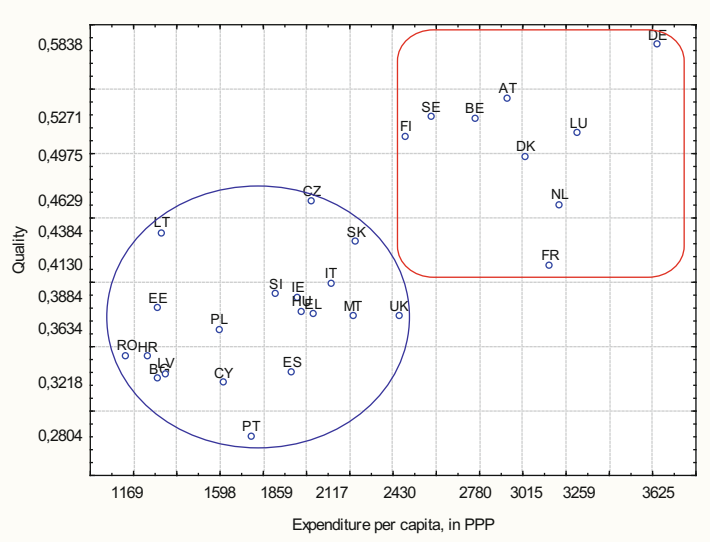

Fig. 3. Scatterplots of healthcare quality vs. expenditure

5 Conclusions and Main Results

The article is based on AHP method for evaluating quality of healthcare systems in EU countries. We have collected opinion of experts for deriving consensus value of weights for the factors included into evaluation healthcare quality model. The weights of selected factors were evaluated also by using multiply regression framework. We have selected the set of variables mostly influencing the healthcare expenditure in EU countries. Though the evaluation of factors weights by experts and by multiply regression analysis don't coincide in some details, we found the healthcare quality ratings and EU countries ranking very similar. This fact let us in some situations replace the long-time consuming poll of experts process using AHP by application of simple multiply regression for factors weight estimation.

The research show that quality of healthcare system of EU countries is in very distinct position. The 'old' EU countries allocate the considerable amount of GDP for this sector and this secure the high level of healthcare.

We also noticed that some countries with the low healthcare budget can boast the long *Healthy life expectancy,* but this mostly happens not through good level of healthcare, but due to other country peculiarity – good climate, healthy food, no stress living conditions and so on.

The results obtained by our research will help the healthcare authorities to identify the shortage in country healthcare system and provide for action improving healthy life expectancy for all EU population.

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Appendix A. Data Set of Healthcare Quality Factors

		Infrastructure			Life style				Country general			Service consumption				Subjective quality measures		
	Total health expenditure per capita, in PPP	Physicians per 100000 population	Nurses per 100000 population	Beds per 1000 population	Alcohol consumption in litres per capita	Regular smokers, % of population aged 15+	Population with Body mass index >=30, in %	People taking care on health-enhancing in %	GDP per capita, in PPP	Education	Gini	Multimorbidity patients, in %	Inpatient care duration	Doctors consultations (in all settings)	Average length of stay in hospitals	Corruption Perception Index	Patient reported evaluation	Public health promotion level
AT	2935	4,8	7,9	7,6	13,8	27,7	8,8	74,9	31588	77,1	27,2	35,8	8,2	6,8	9,8	75		
BE	2780	2,9	15,4	6,3	11	28,1	11,5	51,2	29520	68,1	26,2	24,9	8	6,4	8,4	77		
BG	1319	3,7	4,7	6,4	10	33,7	12,4	17,3	11259	76	37	20,5	8	6,4	5,4	41		
CY	1619	3	4,9	3,5	9,2	30,7	12,3	39,8	23133	71,7	33,6	32	8	6,4	5,8	55		
CZ	2025	3,6	8,5	6,8	11,7	25,4	12,9	52,6	20094	86,1	25	31,5	9,4	6,4	9,4	55		
DE	3625	3,8	11,6	8,2	11,2	24,5	12,2	71,2	30172	81,6	30,1	38,7	9	9,9	9	81		
DK	3015	3,5	15,7	3,5	12,2	35	8,6	81,3	31405	69,3	27,4	28	8	4,5	5,5	90		
EE	1315	3,3	6,5	5,3	7,3	31,6	13,3	47,7	17218	82,3	34,8	45,8	7,6	6,3	9,2	70		
EL	2032	6,1	3,3	4,9	10	38,2	10,7	25,9	20159	62,9	34,2	23,9	8	6,4	6,1	44		
ES	1937	4,1	5,5	3,1	11,9	31,8	11,3	49,0	23793	53	34,6	29,6	8	6,4	5,7	58		
FI	2461	2,7	10,7	5,5	8,8	24,1	10,1	77,0	28560	77,1	25,2	45,9	10,6	4,2	10,5	89		
FR	3127	3,1	9	6,4	14,8	28,1	7,3	51,0	27812	68,9	29,2	37	8	6,3	5,6	69		
HR	1266	2,8	5,7	5,8	12,9	27,4	11	41,4	14703	74,7	30,6	30,6	8	6,5	9,6	49		
HU	1978	3	6,4	7,2	12,8	34,9	18,5	56,6	16433	76,2	28,2	37	9,5	11,8	9,5	48		
IE	1962	2,7	12,6	2,9	12,6	29,3	13	51,2	31933	70,3	32	27,1	6	6,5	6,1	73		
IT	2117	4,1	6,6	3,4	9,5	25,2	8,4	35,0	25380	54,6	32,4	24,7	8	6,5	7,8	47		
LT	1335	3,7	7,2	7,4	7,1	28,6	16	36,3	16413	84,1	37,9	32,3	8	8,7	7,7	59		
LU	3259	2,8	11,6	5,4	14,9	28,3	16,5	63,5	63892	70,9	28,5	22,6	8,8	5,9	8,4	81		
LV	1352	2,9	4,9	5,9	8,7	32,3	15,5	48,6	14439	80,5	35,4	40,6	8,3	5,8	8,5	57		
MT	2218	3,1	6,8	4,5	6,4	25,2	23	52,7	21524	41,1	28,1	28,1	8	6,5	7,9	55		
NL	3172	3	8,6	4,7	9,9	34,1	7,8	51,2	31853	68,3	26,7	34,8	8	8	9	83		
PL	1598	2,2	5,8	6,5	8,4	34,9	11,4	41,2	16092	82,5	30,6	33,9	6,9	7,2	6,9	62		
PT	1748	3	6,3	3,4	13,7	22	12,2	37,2	19500	35,8	34	40,3	8,9	6,5	7,5	62		
RO	1169	2,4	5,4	6,1	10,8	21,7	8,6	15,6	12742	70,6	37,4	18,9	7,4	6,5	7,5	48		
SE	2578	3,9	11,1	2,7	6,3	21,3	8,9	75,4	30807	75,6	25,2	32,5	5,7	2,9	7,1	88		
SI	1859	2,5	8,4	4,6	11,8	25,8	12,3	61,0	20695	80,3	24,5	32,2	6,9	6,6	6,9	61		
SK	2232	3	6,3	6,1	10,5	23,3	16,8	52,3	18777	84,3	23,7	30,3	7,3	11,3	7,3	51		
UK	2430	2,8	10,3	2,9	10	27,4	18,3	58,8	26206	76,2	32,4	34,2	7,1	5,7	6,9	81		

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