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E-Health Adoption Gaps in the Decision-Making Process

Oana Ramona LOBONT[1], Sorana VATAVU[2], Daniel BRINDESCU OLARIU[3], Andrei PELIN[4], Codruta CHIS[5]

Abstract

This paper provides a statistical analysis of the complex decision-making process related to the adoption of eHealth. The analysis refers to the state of information and communication technology (ICT) adoption in the field of health under the perspective of the disparities within the European Union countries, Iceland and Norway. For this research, a composite index was developed for a multi-criteria evaluation of existing inequalities in the quality of life, public health system, and adoption of eHealth. The relative distance method was applied by combining different classification criteria, and returning a hierarchy of the European countries. Then, the disparities were considered based on the status of eHealth adoption, ranking the countries based on life quality and public health system. Results highlight that Romania, along with Latvia, Poland or Bulgaria, are characterised by the lowest level of public health efficiency, due to reduced health expenditures and a healthcare system self-assessed as unsatisfactory by a large proportion of the population. These results have essential implications in the public policies considered in order to reduce the existing gap towards the European average. In addition, a series of challenges are addressed in the direction of preventive strategies, in order to respond to the current pressures of the health systems.

Keywords: eHealth, disparities, composite index, relative distance method, EU, social variables.

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Introduction

This paper investigates the disparities between European countries through composite indices in terms of the public health systems gaps, eHealth implementation and life quality, which is the ultimate goal of health systems. Previous studies explained the high degree of synergy between the health system and technical, political, environmental and economic factors. As long as the orientation towards health protection should be considered worldwide, the health policies, agendas, regulations and budgets should be focused on reducing costs and increasing the efficiency of the national public systems (Balan *et al.*, 2014).

In order to better understand and explore when the adoption of public policies, related to eHealth, have the greatest impact in increasing the public health and life quality, the disparities are analyzed through statistical correlation techniques. Thereby, there are two aspects considered in our research. First, we identify the individual health and compare the efficiency and sustainable development of the public health systems in European countries, in terms of eHealth. In order to accomplish this first objective, our research includes a classification of European countries considering the composite index for every dimension mentioned in the European Commission report on the degree of adopting eHealth in Europe. Second, we explore the eHealth adoption gaps in the decision-making process. A global index of eHealth adoption was developed through Factor Analysis, for every European country, combining availability and effective use of technology.

Estimating the economic impact of eHealth is not easy to achieve, as there is no standardized method for it. In this paper, we consider only the potential of digital solutions. But, the assessment matter emphasises the economic impact induced by ICT use in achieving a qualitative health system. Even when the economic impact has enormous potential, it is still difficult to measure it, especially in terms of benefits, which constitutes a barrier to eHealth development. Reducing the disparities between the Member States is one of the most complex and difficult issues of European and national policies. To meet this goal, policymakers need specific tools such as statistical analysis and econometric synthetic indicators that measure national inequality.

This research starts by presenting the main eHealth strategies and policies promoted by national strategies, and also the data available to observe the level of adoption of eHealth in Europe. The following section, data and methodology, presents the objectives of the study, the criteria used to measure disparities and construct the synthetic indicators, and the methodology proposed. The results are commented after completing every stage of the analysis and a final section concludes, also offering a series of recommendations on policies and strategies to be implemented by countries with poor healthcare systems.

Literature review

The general view is that the functions of a national information system are wide. At European level, the infrastructure, the systems engineering tools and associated techniques for designing, regulating and improving health processes, need to evolve and align with the European eHealth Action Plan launched in 2004. According to *Houghton* (2002), the only way to achieve such a level of use of information and communication technology (ICT) in health systems is the adoption of three conditions, namely a national health strategy, a representative body of specialists and a legal framework in the field. The national health strategy should be endorsed by all the stakeholders involved: ministries, health insurance companies, and professional unions, private companies in the field etc. The organizational aspects regarding a representative body of specialists in the main and major institutions involved should also be considered. This body should be able to constantly update strategies according to the system needs, and ensure the compliance of eHealth projects with a national strategy. Finally, providing a legal framework that allows access to public funding, for those eHealth projects that comply with the strategy adopted, is another aspect certified by the group of experts previously mentioned.

The assessment of the economic benefits generated by implementing eHealth expresses some generic methods of evaluation. By focusing on economic performance, these methods are usually based on quantitative indicators and best practices existing in the Member States. One of the methods proposed, with high robustness degree, is based on the cost-benefit analysis. It requires the initial investment cost and benefits, analysing all those involved in the system. Therefore, the cost of the initial investment and ongoing eHealth includes the cost of ICT, the cost of the effective change management, and the actual operating cost of health care. The benefits refer to an increase in quality, access, and cost-effectiveness, but also refer to the costs involved by failures. These are the necessary aspects to achieve the performance of a system using ICT, otherwise, these costs would be prohibitive. In addition, many individuals and organisms are involved in the system: citizens, professionals, suppliers etc.

Assessment of disparities requires a large volume of data and information on various variables, such as economic, cultural, social and political variables, which exert influence. For this reason, in addition to the usual statistical data collected every year in eHealth domain, the European Commission finances regular surveys on the use of technology in health systems. The latest survey regarding the adoption of eHealth in Europe was realized Codagnone and Lupian-Villaneuva (2013). The survey was conducted among general practitioners in the European Unionand related to the awareness and use of information technology in daily routines and relationships with patients. Codagnone and Lupianez-Villaneuva analysed 31 European states (EU-28, Iceland, Norway and Turkey) and used factor analysis, grouping the various forms of eHealth presence on broader areas and countries

showing that, in terms of basic ICT access (computer and Internet connection), adoption is widespread to 97%. Digitizing health data, while the average level is based on the electronic exchange of information highlights a high level of adoption. In other areas, such as telemedicine, there is still room for improvement. The study also showed significant discrepancies between European countries, where Denmark was on top, having a level of eHealth adoption of 65%, while the last one ranked, Lithuania, had only 33%. The European average was below 50%.

Jeremic *et al.* (2012) conducted a study on the effectiveness of public health systems, using the statistical technique of the first distances method, classifying the European countries according to two sets of indicators (input indicators, concerned with the public health systems, and output indicators, referring to general health). This offered a classification of countries according to the public health systems performance.

Seke *et al.* (2013) considered that public health is a precondition for sustainable development and it needs constant enhancement and investment. Based on a set of indicators of the European Commission and Eurostat regarding public health, measured by life expectancy at birth, mortality, healthy life expectancy at birth and other, the authors employed the first distances method for ranking the European countries. The correlation between the input indicators and the results demonstrate that the most significant indicators for the sustainable development in terms of public health are the healthy life expectancy at birth, mortality due to chronic diseases for men and healthy life expectancy at age 65 for women.

Data and methodology

There are two distinctive objectives in this paper, and thus the methodology proposed consists of *i)*a statistical analysis of disparities in European countries on individual health measured through the quality of life and also the quality of public health systems; *ii)*a statistical analysis of disparities in European countries on the adoption of eHealth, based on the countries hierarchy. The approach was developed for EU28, Norway and Iceland, in order to identify the public policies necessary for the ICT implementation in Romania, resulting in an increase of life quality and public health systems efficiency, and a reduction of the gap between Romania and other EU members.

The empirical analysis developed in this paper proposes a multi-criteria characterization of European countries from the perspective of disparities between the levels of adopting and implementing eHealth. In order to capture thesefeatures, several variables need to be considered simultaneously, using the relative distance method to combine different criteria and obtain a hierarchy.

The relative distance method is transforming the initial values in relative distance compared to the most performant value for every criterion (Ceausescu,

2011; Totan, Geamanu, & Tudose, 2012). $\frac{Xij}{Xmax\,j}$ measures the relative distance of every country to the best performing country according to criterion (j). The relative distances are calculated for every classification criterion (j). After, the mean of the relative distances for every country is calculated for all criteria (j), as the simple geometric mean of the previous results:

$$D_i = \sqrt[m]{\prod_{j=1}^{m} \frac{Xij}{Xmax\,j}} \sqrt[m]{\prod_{j=1}^{m} \frac{Xij}{Xmax\,j}} \quad (1)$$

where m is the number of criteria used.

In the end, the countries (i) are ranked according to their decreasing average relative distance (D_i).

Disparities within a country can be compared with those in other countries only if there is a common basis. In order to satisfy this relative distance method requirements, the performance of the best country for criterion *j*($X_{max\,j}$) will be replaced with the average value at European level (), resulting in the following formula of the average multi-criteria distance for every country *j*:

$$D_i = \sqrt[m]{\prod_{j=1}^{m} \frac{Xij}{\overline{Xj}}} \sqrt[m]{\prod_{j=1}^{m} \frac{Xij}{\overline{Xj}}} \quad (2)$$

This way, we obtain a firm and fixed position of every country towards the European average, allowing comparisons at different levels, both European and national. The economic criteria used to measure disparities must be represented by synthetic indicators, relevant to the analysis and comparable in space. Given the objectives of this paper, but also the database available, we selected the criteria that reflect both individual health and the quality of public health systems. These indicators were also applied by Jeremic *et al.* (2012), Seke *et al.* (2013) or Jovanovic-Milenkovic, Jeremic, & Martic (2014), in their studies.

The data used in this paper was gathered from national and international statistics and databases such is Eurostat, World Health Organization (WHO), World Bank and the Organisation for Economic Co-operation and Development (OECD). In order to classify the European countries, according to the quality of life, the following criteria were used: life expectancy at birth in years -*le*; healthy life years at birth, women -*hlw*; healthy life years at birth, men-*hlm*; people having long standing illness or health problems, % of total population -*pill*; healthcare self-assessed as unsatisfactory, % of total population -*ush*; adult mortality rate, % calculated from absolute values -*amr*; Infant mortality rate, calculated per 100,000 people-*imr*.

In order to compute the composite index of life quality (D_i) the following seven indicators were considered (data available for 2016): life expectancy atbirth - $X_{i\,le}$; healthy life years for women - $X_{i\,hlw}$; healthy life years for men - $X_{i\,hlm}$; individuals with long standing illness or health problems- $X_{i\,pill}$; unsatisfactory health care assessment - $X_{i\,ush}$; adults mortality- $X_{i\,amr}$; and infant mortality - $X_{i\,imr}$. Therefore, equation (2) becomes:

$$D_i = \sqrt[7]{\frac{X\,i\,le}{\bar{X}\,i\,le} * \frac{X\,i\,hlw}{\bar{X}ihlw} * \frac{Xi\,hlm}{\bar{X}ihlm} * \frac{\bar{X}i\,pill}{X\,i\,pill} * \frac{\bar{X}iush}{X\,iush} * \frac{\bar{X}\,i\,amr}{X\,i\,rma} * \frac{\bar{X}iimr}{X\,iimr}} \quad (3)$$

where D_i is the composite index of disparities, i.e. the multi-criteria distance in relation to the average at European level for every country i. The srepresents the average values of each one of the seven indicators, at European level.

For the classification of European countries according to the quality of the public health system the following criteria were used, having the same database sources Eurostat, OECD and WHO: health expenditures, % of GDP -*hexp*; *government expenditure* on *health*, % of GDP -*govexp*; number of doctors per 100,000 inhabitants -*ndoc*; number of dentists per 100,000 inhabitants -*ndent*; number of nurses per 100,000 inhabitants -*nnurse*; number of hospital beds per 100,000 inhabitants - *nbed*.

Regarding the second objective, respectively the analysis of disparities in European countries on the adoption of eHealth, it was considered the survey funded by the European Commission about awareness and use of information technology in daily routines and relationships with patients, from the general practitioners'point of view (Codagnone & Lupian-Villaneuva, 2013). The survey contained wide range of questions and areas of ICT usage. These were grouped into four main dimensions:*i)* EHR (Electronic Health Record) refers to systems used by doctors and nurses to enter, store, view and manage patients health, administrative information and their data; *ii)*HIE (Health Information Exchange) referring to electronic transfer process, dividing, sharing patients information; *iii)* TeleHealth includes the use of broadband platforms to provide health services, medical training, and health education; *iv)*PHR (Personal Health Record) refers to electronic systems offering patients secure access and management of personal health information.

Results

The overall index regarding eHealth adoption was developed through Factor Analysis, combining the availability and the effective use of the technology in every EU country. In this paper, we compared it with the composite index obtained through the relative distances method. The R square coefficient regarding the correlation analysis of the two sets of composite indexes indicates that they are virtually identical, with a value of 0.9767.

Both disparities values, average and individual, reflect favorable situation when they are above 1, and unfavorable conditions when they are below 1. After computing the composite index of quality of life, the European countries were ordered based on its values, as shown in the following figure:

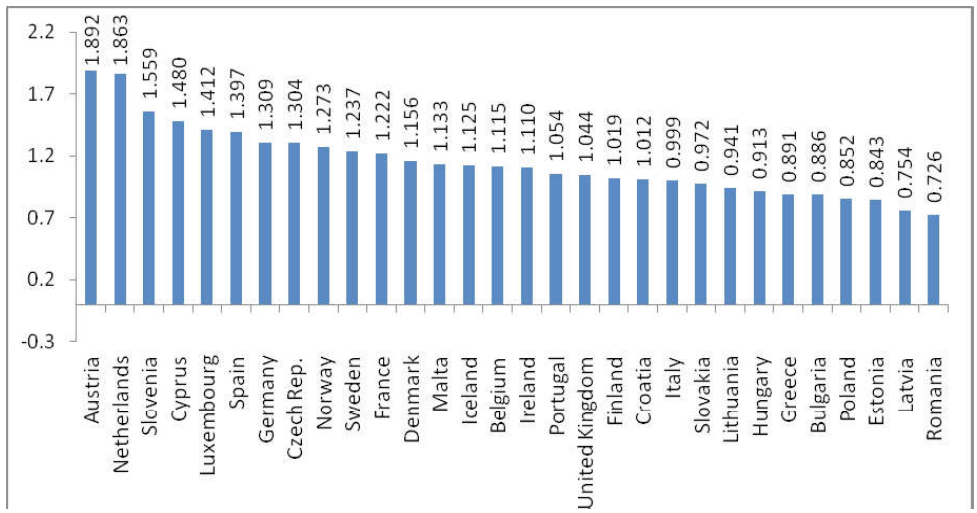

Figure 1. Composite index of individual health

Figure 1 shows that Austria, Netherlands, and Slovenia are the "healthiest" European countries, while Poland, Estonia, Latvia, and Romania are at the bottom of the classification. For a better understanding of the classification, it is essential to identify which variables have more input in assessing individual health. The top positions are not surprising, as Austria, Netherlands, and Slovenia are the only countries with unsatisfactory self-reported healthcare indicators below 0.5% of the population. On the opposite side, according to the statistics analysed, Romania, Latvia, Estonia, and Poland were, in this order, the countries with the most unsatisfactory healthcare system based on their citizens' assessment (31.5% for Romania, 19.5% for Estonia, and 15.9% for Latvia and Poland).

The agglomerative *hierarchical cluster analysis* was applied on the 30 countries analysed in order to make a group based on four variables, those identified as most significant (*ush*, *le*, *amr*, *imr*) based on regression coefficients presented in *Table*

1. Results were obtained by regressing the composite index of individual health, as dependent variable, against the quality of life criteria.

Table 1. Determination coefficients between composite indexof individual health and quality of lifevariables

Independent variable:	le	hlw	hlm	pill	ush	amr	imr
Coef. (t-stat)	0.061*** (3.86)	0.005 (0.47)	0.014 (1.43)	0.002 (0.25)	-0.026*** (-5.25)	-0.711*** (-3.77)	-0.0757** (-2.40)
R-squared	0.3468	0.0078	0.0676	0.0022	0.4962	0.3364	0.1711
F test	14.86***	0.22	2.03	0.06	27.58***	14.19***	5.78**

****, **significant at 1%, 5% level.*

The coefficients indicate that healthcare self-assessed as unsatisfactory (*ush*) is the most significant variable in determining the individual health condition, followed by life expectancy at birth (le), adult mortality rate (*amr*) and infant mortality rate (*imr*).

Taking into account that on one hand, health is a national decision, and on the other hand, particularly for eHealth adoption, the technology has no geographical barriers in Europe, the further step in the statistical analysis does not lead to the goal of this analysis, as it is not the most appropriate technique for identifying the priorities in eHealth adoption. Therefore, the second stage of analysis refers to applying the formula (2) to the chosen criteria for evaluating public health systems, in order to calculate the composite index of the quality of public health systems in European countries, identifying its value and classifying the European countries as shown in *Figure 2*:

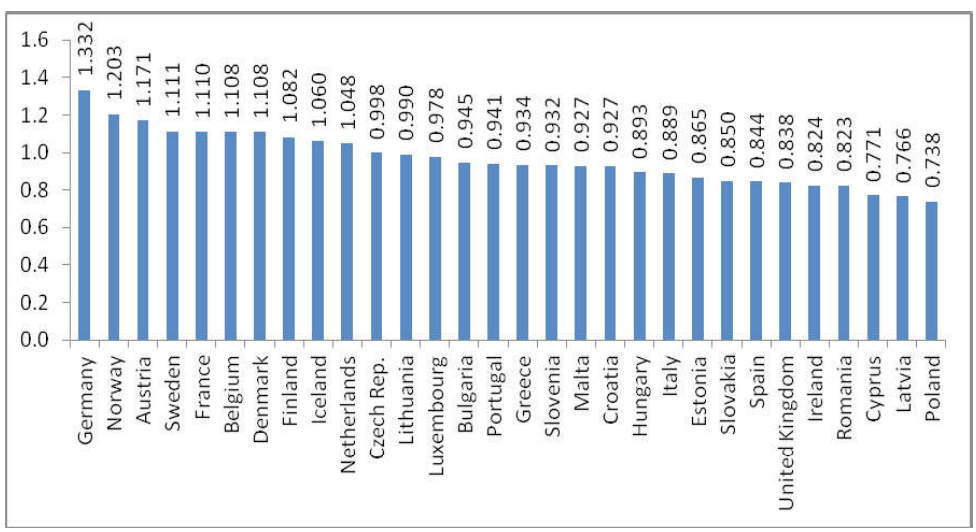

Figure 2. Composite index of public health system

Germany, Norway, and Austria are situated on top, being the countries that invest the most in their healthcare systems. On the opposite are Poland, Latvia, and Cyprus. To understand this classification more into depth, it is essential to clarify which variables (criteria) bring most input in assessing the public health system. The dataset was further examined through regressions between the values of each criterion originally set as an explanatory variable, and its distance relative to the European average, as the dependent variable, observing the R-squared coefficient. The results are presented in *Table 2.*

Table 2. Determination coefficients between composite index of public health system and quality of public health system variables

Independent variable:	hexp	govexp	ndoc	ndent	nnurse	nbed
Coef. (t-stat)	0.059*** (5.97)	0.058*** (5.88)	0.001** (2.13)	0.0015 (1.07)	0.0003*** (5.17)	0.0001 (1.00)
R-squared	0.5598	0.5362	0.139	0.0394	0.4884	0.0342
F test	35.61***	34.53***	4.53**	1.15	26.73***	0.99

****, ** -significant at 1%, and 5% level, respectively.*

According to the coefficients presented in Table 2, the most significant variable in classifying the European public health systems is the level of health expenditure, closely followed by the level of government expenditure on health and the number of nurses.

Assuming that the level of individual health is a result of the quality of public health system, a comparison between the two composite indices of individual health and public health system will be further realized in order to assess and implement a ranking system for health system efficiency. Therefore, for every European country included in the study, the average distance relative to its own public health system divided the relative distance from the average individual health. Results are illustrated in *Figure 3*.

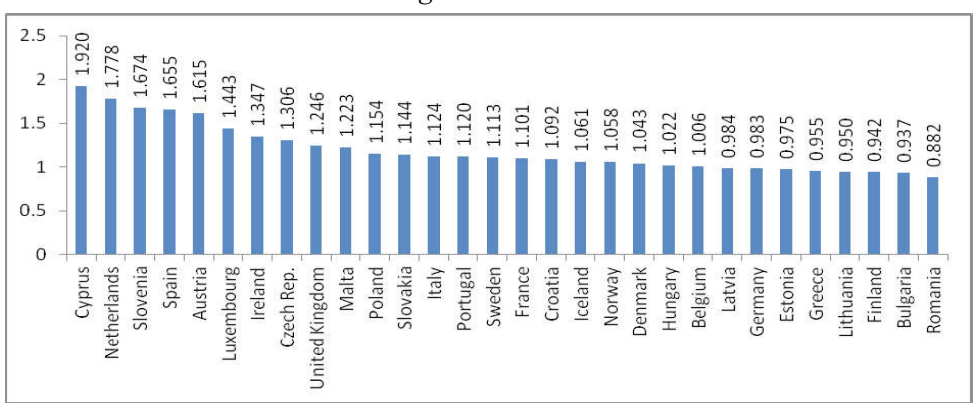

Figure 3. Public health system efficiency

Cyprus, Netherlands lead in this classification of public health system efficiency, followed by Slovenia, Spain and Austria, all with a significant difference (the public health system efficiency indicator is higher than 1.6) to the rest of the countries. On the right side of the graph are Lithuania, Finland, Bulgaria and Romania with the lowest level of public health efficiency (the public health system efficiency indicator is lower than 0.95).

Cyprus is leading the public health system efficiency order based on the individual health index, of high value, and a very weak public health system index. Although the two are contrasting, the quality of life in Cyprus is exceptionally high due to the lowest infant mortality rate in EU, the third lowest adult mortality rate in EU and a life expectancy of approximately 82 years, which is higher than the average European age. Spain, also in the top five countries with efficient public health system has the highest life expectancy (83 years). Also, the healthcare is self-assessed as unsatisfactory by less than 2% of the population in both countries, considering that the European average is 7.3%. These indicators are undoubtedly based on specific causes, such as the healthier lifestyles in the Mediterranean regions. These conclusions were also found by Tourlouki *et al.* (2010) and Jeremic *et al.* (2012) who mentioned Cyprus as the country with the most efficient health system due to external factors, other than those related to public expenditures, such as healthier Mediterranean diet.

The Netherlands, Slovenia and Austria are also among the most efficient countries in terms of the individual health system and this is due to their highest individual health index (as observed in *Figure 1*). They have the lowest proportions of population assessing the healthcare as unsatisfactory (below 0.5%). Besides, compared to the European average, they indicate higher life expectancy at birth and lower adult mortality rates.

For the countries classified as having the poorest healthcare system, more specifically Lithuania, Bulgaria and Romania, the quality of life index computed indicated reduced values. This was due to the lowest life expectancy at birth (less than 75 years), highest adult mortality rates (more than 1.28% considering the EU average of 0.976%) and alarming infant mortality rates for Bulgaria and Romania (more than 6.87 and respectively 8.57 per 100,000, when the EU average rate is 3.75). Excepting Romania, which was at the bottom of the composite index of public health system classification (due to the lowest health expenditure and a very reduced *government expenditure* on *health)*, Lithuania and Bulgaria were close to the average index, while Finland is on the eighth place out of the 30 countries studied (with values for the criteria used in the composite index of public health system higher than the European average). However, with a rather low index reflecting the quality of life, the overall efficiency of the public health system will be affected even though the health system criteria seem fulfilled.

In the third stage of the analysis, returning to eHealth, even though the European Commission has calculated composite index of eHealth adoption in European

countries, using Factor Analysis (FA), formula (2) was used for the calculation of the global composite index in order to calculate relative distances method (RDM) based on the four dimensions proposed by Codagnone and Lupian-Villaneuva (2013). Results are illustrated in *Figure 4*.

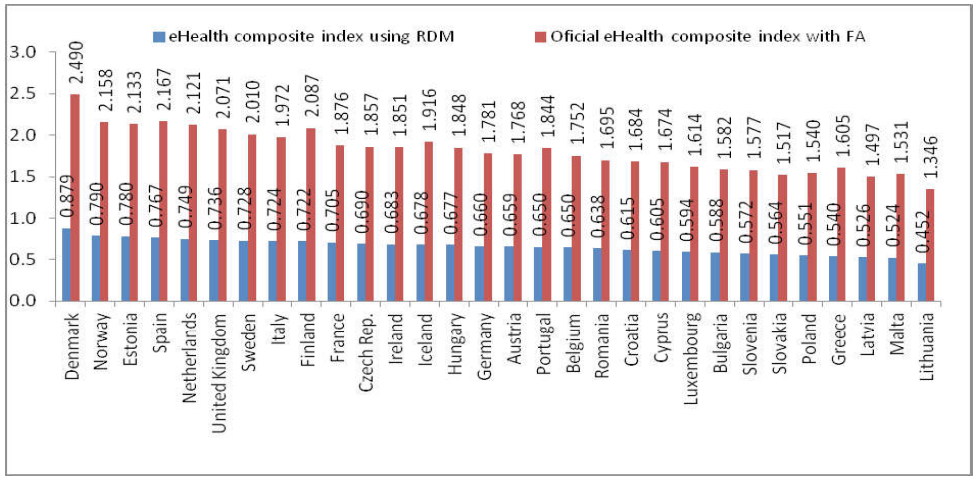

Figure 4. Composite index for eHealth

The differences in the two methods of classification of the European countries are minor. These are correlated between the two sets of data, as shown in the simple linear regression model. The relationship is strong as reflected by a determination coefficient of 0.9767.

Another set of regressions was performed between the various dimensions of eHealth adoption as factorial variables (independent variables) and the composite index of individual health, respectively the quality of the public health system as dependent variables. These were considered in order to identify those areas where the use of information technology has a greater impact, outlining the public policies that should have a priority in the adoption of ICT in health. The main results are included in *Table 3*.

Table 3. Regressions on eHealth dimensions

Dependent variable: Individual health	Independent variables:			
	EHR	HIE	TeleHealth	PHR
Coef. (t-stat)	0.416*** (21.82)	0.598*** (15.94)	0.83*** (20.54)	0.855*** (18.25)
R-squared	0.9426	0. 8976	0.9357	0.9199
F	475.98***	254.11***	421.92***	333.15***
Dependent variable: Public health system	Independent variables:			
	EHR	HIE	TeleHealth	PHR
Coef. (t-stat)	0.348*** (29.84)	0.505*** (21.74)	0.693*** (25.13)	0.719*** (24.72)
R-squared	0.9685	0.9422	0.9561	0.9547
F	890.67***	472.73***	631.55***	611.26***

*** - *significant at 1% level*

Based on the main four dimensions of eHealth adoption, it seems that in countries where the electronic registration of health information is important, citizens have an increased quality of life. The other three dimensions of eHealth adoption also have a direct impact on individual health, with a slightly lower R-squared value. Further investment is needed in the direction of recording personal health data, in order to enable patients to consult, add and view test results or medical records. For example, the health card allows data entry, but only by authorized personnel, and at the request of the person insured.

As the R-squared coefficients of the linear regression referring tothe composite index of eHealth adoption indicated, it has even more influence on the public health system than on individual health. Essentially, an infrastructure allowing exchange of health information will be associated with a better public health system. From the perspective of improving both, individual health and quality of public health system, these would be positively influenced by the actual administration of the electronic recording of health information assuming that this is realised with utmost accuracy and efficiency. From this point of view, investments should focus on improving the technical resources to record, view and manage the administrative and medical data of patients, by health service providers (doctors, nurses etc.). This would help different stakeholders involved in the public health system save time and financial resources through interoperable clinical information exchange, ensuring certain standards for their services and products.

The second priority in terms of the public health system quality should be the technology that facilitates the exchange of patient information. In this direction, changes were made in terms of adopting electronic prescription. Although the former medicine regulations specified that legitimate prescriptions must have a handwritten signature, the electronic prescription and dispensing process became more common in developed healthcare systems. Other action areas such as doctor's

appointment, sending lab results, settlement services with the National Health Insurance House, exchange of medical information regarding patients between doctors etc. should be considered for the implementation of the electronic exchange of health information in all countries in order to reduce the gap between the qualities of health system in EU member states.

Conclusion

Based on this study, the relative distances method can be successfully applied in multi-criteria classification of European countries, supporting the index resulted from subsequent correlations in order to determine the specific weight of each criterion used in realizing the hierarchy. The results of the ranking obtained in accordance with the relative indicators to the quality of life show that the healthcare self-assessed as an unsatisfactory variable has the largest proportion in this hierarchy. As this variable can be based on personal perceptions, it can be further analyzed by seeking correlations with other indicators, which are not necessarily from the field of eHealth (for example, a healthier lifestyle involving quitting smoke, exercise, healthy diet, or stress control).

A focus on informing citizens on the role of health information technologies could also result in a more efficient public health system and increased quality of life, as indicated through our results related to Electronic Health Record. Public bodies consisting of experts and a framework that allows access to public funding for eHealth projects could be used as means of public information and could be even more efficient in relation to health service providers. Such cooperation, referring to doctors, more specifically dentists, teachers and parents, proved its relevance in improving the oral hygiene behavior of children (Matichescu *et al.*, 2016).

The econometric analysis focused on correlations proved that the impact of eHealth adoption on increasing the quality of life is significant, even greater in terms of public health. As eHealth is part of the health system, increasing its adoption would result in direct increase in the quality of public health systems. The Electronic Health Record dimension was proved to have a statistically significant impact on both, individual health and public health system. However, the impact on improving the quality of life is visible through an improvement of the quality of public health system, due to the adoption of eHealth.

The correlation results regarding the eHealth sub dimensions indicate the most intense relationships with the overall index of disparities for European public health systems. Therefore, policies, strategies and public investments must be primarily oriented to allow and facilitate the records of medical and administrative data, management and exchange of such data between health system personnel.

Moreover, financing strategies adopted at national and regional levels widely affect eHealth adoption procedure or reduce its long-term sustainability. Due to the lowest health expenditure and reduced *government expenditure* on *health Romania is classified* as having the poorest healthcare system in the EU.

As a conclusion of this paper, eHealth could meet some of the key needs in European health systems facing a high demand from patients, aging, medical errors and increased costs. eHealth must be correlated with both, organizational innovations and development of new skills. Across Europe, there is still a significant percentage of doctors who do not use technology in relation to their patients, blaming bureaucracy and lack of added value to their direct service. At European level, only 13% of general practitioners are enthusiastic and use eHealth in their routine practice (Codagnone & Lupianez-Villaneuva, 2013). For this reason, for example in Romania, sabotages related to the implementation and mainstreaming of health cards were anticipated when the cards were made mandatory, and the health system considered the anti-fraud role. Over the long term, the evolution towards eHealth is compulsory because, on one hand, it is orientated towards patients, aiming to provide better service and lower costs, and on the other hand, it is the solution that can meet current and future challenges related to increasing and aging population.

References

Balan, A., Savin, C., Balan, G.G., & Zetu, I. (2014). Health protection and international relations. A postmodernist approach. *Revista de Cercetare si Interventie Sociala*, *45*, 160-174.

Ceausescu, A.I. (2011). Ierarhizarea judetelor şi a regiunilor prin cuatificarea inegalităţilor cu ajutorul metodei distanţelor relative. *Analele Univ. „Constatin Brancusi" Tg. Jiu, Seria Economie*, 3/2011, 38-41.

Codagnone, C., & Lupianez-Villaneuva, F. (2013). Benchmarking Deployment of eHealth among General Practitioners 2013-Final Report. Retrieved from http://ec.europa.eu/information_society/newsroom/cf/dae/document.cfm?doc_id=4897

Houghton, J. (2002). *Information Technology and the Revolution in Healthcare.* Working Paper. Victoria University, Melbourne, Australia. Retrieved from http://vuir.vu.edu.au/15924/1/15924.pdf

Jeremic,V., Bulajic, M., Martic, M., Markovic, A., Savic, G., Jeremic, D., and Radojicic, Z. (2012). An evaluation of European Countries' Health systems through Distance Based Analysis. *Hippokratia*, *16*(2), 170-174.

Jovanovic-Milenkovic, M., Jeremic, V., & Martic, M. (2014). Sustainable development in the e-Health sector of European Union. *Journal of Environmental Protection and Ecology*, *15*(1), 248-256. doi: 10.1186/1471-2458-13-77

Matichescu, A., Matichescu, M.L., Ogodescu, A.S., Luca, M.M., & Rosu, S. (2016). Oral hygiene behaviour. Case study of primary school children from Timis county. *Revista de Cercetare si Intervenţie Sociala*, 54, 142-155.

Seke, K., Petrovic, N., Jeremic, V., Vukmirovic, J., Kilibarda, B.,& Martic, M. (2013). Sustainable development and public health: rating European countries. *BMC Public Health*, *13*, 77. doi: 10.1186/1471-2458-13-77

Totan, L.S., Geamanu, M., & Tudose, G. (2012). Mutatii structurale ale fortei de munca din Romania dupa 1990. *Romanian Statistical Review*, 9/2012. Retrieved from http://www.revistadestatistica.ro/Articole/2012/RRS09_2012_a5_ro.pdf