
Health System Responsiveness in the Light of the Euro Health Consumer Index

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Abstract:

Purpose: The paper aims to assign the characteristics of the systems' responsiveness due to patient satisfaction. We base our analysis on the Euro Health Consumer Index (EHCI), including indicators from six categories, i.e. patient rights and information, access to medical services, treatment results, scope and range of medical services offered, prevention of vaccination patients, access to medicines.

Design/Methodology/Approach: We investigate data from 2014 to 2018 for thirty-five countries. The studied group of countries is divided into two subgroups - the group of countries with the Bismarck model (group A) and those with Beveridge's model (group B). Ward's method was used as a method of cluster analysis.

Findings: (1) The number of clusters is stable over time – both in 2014 and 2018, five clusters are identified; (2) The number of clusters within subgroups A and B is similar and stable over time; (3) The number of clusters created suggests that the responsiveness of health systems is a complex concept perceived by patients in different ways; (4) There are no essential differences between countries with the system of public health and countries where health financing bases on insurance schemes.

Originality/value: The results suggest that the system's responsiveness cannot be perceived as one-dimensional. While assessing the system's responsiveness, patients take into consideration different factors.

Keywords: Health, health care system, system sensitivity, patient satisfaction, system responsiveness, Euro Health Consumer Index.

JEL classification: I10, I14, I15.

Paper Type: A research study.

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1. Introduction

Over the last several decades, assessing healthcare systems' efficiency has been launched in many countries. Public opinion polls on the proper functioning of the health sector have become the focus of interest of global organisations dealing with health issues (WHO), governments of individual countries, and representatives of the world of science. Despite their diversity across countries, health systems perform similar functions. Their main task is to promote and improve citizens' health and well-being and take responsibility for its effective and efficient functioning.

Over the past few decades, in many countries, the measures of health system assessment have been launched (Table 1). The first health reports were drawn up in the 1880s. Over the following years, they evolved and took place in many places worldwide, including Denmark, Sweden, Great Britain and the United States. The main goal of these rankings is to study the dynamics of changes taking place in health care systems, compare their efficiency and effectiveness in the international dimension, and search for good practices and practical solutions to the challenges of the present and the future.

One of the essential characteristics of a well-functioning health system is its responsiveness to the needs of patients as a measure of patient's satisfaction. From the beginning, studies took place mainly in the high-income countries - North America and Western Europe (Valentine *et al.*, 2000). Now, it is an important fields of research in low-icome or developping countries (Malhotra and Do, 2013; Gouveia, Souza, Luna, Souza-Júnior, and Szwarcwald, 2005; Peltzer, 2009). Indeed, this is a bigger problem for developing countries, but also in European countries, there is still room for quality improvement (Coulter and Cleary, 2001).

Table 1. Initiative in the area of measurement of health system's performance

1981	Health For All
1999	NHS High-Level Performance Framework
2000	The National Indicator Project, Health System Performance
2003	European Community Health Indicators
2004	Performance Assessment Tool for Quality Improvement in Hospitals (PATH) Australia's National Health Performance Committee's Framework
2005	Canadian Institute for Health Information's Performance Framework De Zorgbalans (Netherlands National Health Care Report) US National Healthcare Quality Report Euro Health Consumer Index
2007	Health Care Quality Indicators Project designed by OECD for EU

Source: Own elaboration based on: <https://www.pwc.pl/pl/pdf/publikacje/2019/indeks-sprawnosci-ochrony-zdrowia-2018-raport.pdf>.

The paper aims to assign the characteristics of the systems' responsiveness due to patient satisfaction. We base our analysis on the Euro Health Consumer Index

(EHCI), including indicators from six categories, i.e. patient rights and information, access to medical services, treatment results, scope and range of medical services offered, prevention of vaccination patients, access to medicines. In the last ranking (2018), the highest scores were given to Switzerland (893 points out of 1000 possible), the Netherlands (883 points) and Norway (857). These three countries have been at the top of the ranking for years and consistently achieve the best results in all categories (Table 2).

Table 2. *EHCI ranking leaders 2005-2018*

Year	I place in the ranking (number of points)	II place in the ranking (number of points)	III place in the ranking (number of points)
2005	Netherlands (48)	Switzerland (47)	Germany (46)
2008	Netherlands (824)	Denmark (820)	Austria (784)
2009	Netherlands (824)	Austria (813)	Luxemburg (795)
2010	Netherlands (857)	Germany (825)	Island (821)
2012	Netherlands (872)	Denmark (822)	Island (799)
2013	Netherlands (870)	Switzerland (851)	Island (818)
2014	Netherlands (898)	Switzerland (855)	Norway (851)
2015	Netherlands (916)	Switzerland (894)	Norway (854)
2016	Netherlands (927)	Switzerland (904)	Norway (865)
2017	Netherlands (924)	Switzerland (898)	Denmark (864)
2018	Switzerland (893)	Netherland (883)	Norway (857)

Source: Own study based on available reports EHCI from the years 2005-2018.

2. Data and Methods

We investigate data from 2014 to 2018 for thirty-five countries Albania, Austria, Belgium, Bulgaria, Luxembourg, Malta, Montenegro, Netherlands, North Macedonia, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, United Kingdom. The studied group of countries is divided into two subgroups - the group of countries with the Bismarck model (group A) and those with Beveridge's model (group B) (Rabiej, 2017):

- Group A: Albania, Austria, Belgium, Croatia, Czech Republic, France, Germany, Hungary, Lithuania, Luxemburg, Netherlands, North Macedonia, Poland, Serbia, Slovakia, Slovenia, Switzerland;
- Group B: Bulgaria, Cyprus, Denmark, Estonia, Finland, Greece, Iceland, Ireland, Italy, Latvia, Malta, Norway, Portugal, Romania, Slovenia, Spain, Sweden, United Kingdom.

We base on the Euro Health Consumer Index (Table 3). The article aims to assign the characteristics of the systems' responsiveness due to patient satisfaction. As a primary research method, we use cluster analyses, allowing isolating internally coherent groups of objects. It allows comparing and classifying objects that are

described using multiple diagnostic variables. Finally, the following diagnostic variables are selected (Table 3).

Table 3. System responsiveness features examined by the Euro Health Consumer Index

Patient Rights & Information		Accessibility (waiting times for treatment)	
1.1 ⁴	Healthcare law based on Patients' Rights	2.1	Family doctor same day access
1.2	Family doctor same day access	2.2	Direct access to specialist
1.3 ⁵	No-fault malpractice insurance	2.3	Major elective surgery <90 days
1.4	Direct access to specialist	2.4	Cancer therapy < 21 days
1.5	Major elective surgery <90 days	2.5	CT scan < 7days
1.6	Cancer therapy < 21 days	2.6 ⁶	Waiting time for Paediatric Psychiatry
1.7	CT scan < 7days		
1.8	Waiting time for Paediatric Psychiatry		
1.9	Provider catalogue with quality ranking		
1.10	Patient records e-accessible		
1.11	Patients' access to on-line booking of appointments?		
1.12	e-prescriptions		
Outcomes		Range and reach of services provided	
3.1	30-day Case Fatality for AMI	4.1	Equity of healthcare systems
3.2	30-day Case Fatality for stroke	4.2	Cataract operations per 100 000 age 65+
3.3	Infant deaths	4.3	Kidney transplants per million pop.
3.4	Cancer survival	4.4	Is dental care included in the public healthcare offering?
3.5	Deaths before 65 YO	4.5	Informal payments to doctors
3.6	MRSA infections	4.6	Long term care for the elderly
3.7	Abortion rates	4.7	% of dialysis done outside of clinic
3.8 ⁷	Suicide rates	4.8	Caesarean sections
3.9 ⁸	% of diabetes patients with HbA1c<7		
Prevention		Pharmaceuticals	
5.1	Infant 8-disease vaccination	6.1	Rx subsidy
5.2	Blood pressure	6.2 ⁹	Laymanadapted pharmacoeia
5.3	Smoking Prevention	6.3	No vel cancer drugs deployment rate
5.4	Alcohol	6.4	Access to new drugs (time to subsidy)
5.5	Physical activity	6.5	Arthritis drugs

⁴The value of this indicator is given till 2016.

⁵The value of this indicator is given till 2016.

⁶This indicator was changed in 2017.

⁷This indicator was changed in 2017.

⁸This indicator was changed in 2017.

⁹The value of this indicator only up to 2016.

5.6	HPV vaccination	6.6	Statn use
5.7	Traffic deaths	6.7	Antibiotics/capita

Source: Own study based on European Health Consumer Index.

The very formulation of the research hypothesis regarding assessing the characteristics of the health system's responsiveness related to patient satisfaction seems risky in the context of previous studies. That is why we rely primarily on exploratory data analysis, focusing on the perception of individual aspects of the health care system's responsiveness. The following research questions are formulated as follows:

- *Is the number of clusters stable over time?*
- *Are there differences in the number of clusters depending on the model of health care financing?*

Ward's method is used to group the similarity of the health care system responsiveness to answer these questions. The Ward method is a classic method of cluster analysis that is based on the analysis of variance¹⁰. Hierarchical cluster analysis methods consist of building a hierarchy of clusters starting from the smallest ones (composed of individual objects) and ending with the largest ones (composed of the maximum number of objects). Clusters are created based on the similarity matrix of objects (Ward, 1963; Lance and Williams, 1966a; 1966b; 1967a; 1967b; Johnson, 1967; Gordon, 1987; Stanisz, 2007; Panek, 2009; Sojka, 2013a; Szkutnik, 2015; Sojka *et al.*, 2020).

When grouping objects into clusters, different distance measures between the studied objects are used in cluster analysis. We employ the "Manhattan urban distance". Two methods were used to cut off the dendrogram, determining the number of clusters (Nowak 2004; Kiniorska and Brambert 2018). The first method uses the rule of Mojena (1997), where the cutting point is the bond distance (Zalewska, 2017) (equation 1):

$$d_{i+1} > \bar{d} + k * s(d) \quad (1)$$

where \bar{d} is the arithmetic mean of the length of the bonds,
 $S(d)$ - standard deviation of the length of the bonds.

Mojena proposes $k \in (2,75; 3,50)$ or $k = 1,25$, determined based on the research of Milligan and Cooper (1985). The second way is to analyse the agglomeration waveform - a line graph of the distance of the bonds relative to the subsequent stages of the binding process (Zalewska, 2017; Sojka *et al.*, 2020).

The following stages of the study are adopted:

¹⁰ <http://manuals.pqstat.pl/statpqpl:redpl:skupienpl>

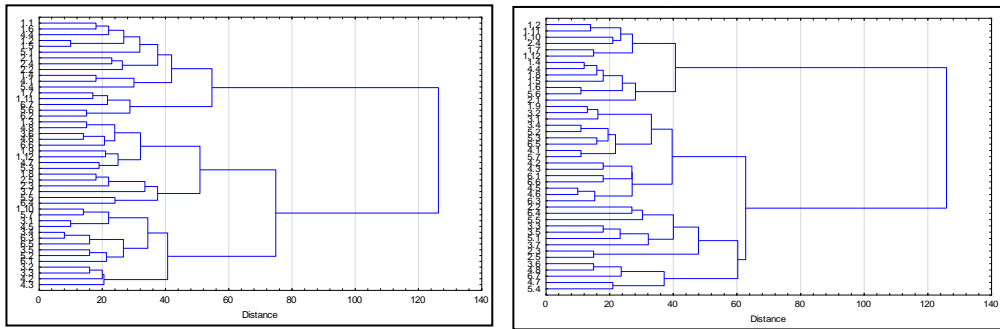
- grouping due to similarities in the responsiveness characteristics of the health care system in thirty-five countries,
- grouping due to similarities in the responsiveness characteristics of the health care system in group A and group B,

The calculations are supported by Statistica.

3. Results

Dendrograms show the degree of similarity of health care systems due to their responsiveness, separately in 2014 and 2018 (Figure 1). Each cluster has a different health care system responsiveness pattern, and each of them has a similar healthcare satisfaction profile. Based on dendrograms analysis (Figure 1), five clusters with similar responsiveness characteristics can be created.

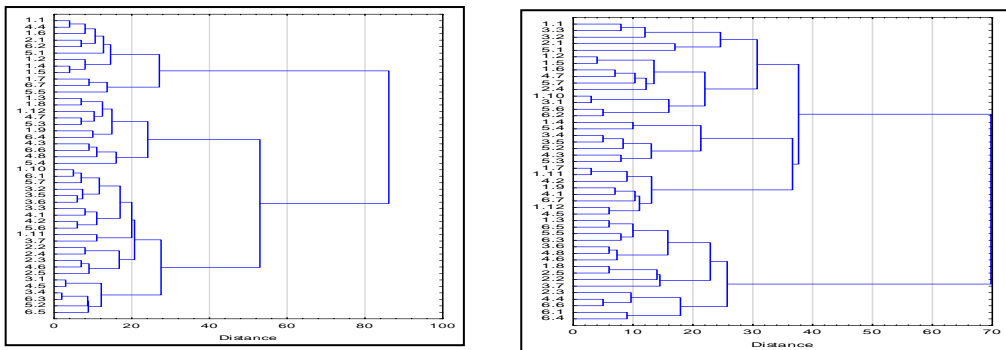
Figure 1. Cluster analysis, all countries, 2014 (on the left) and 2018 (on the right)



Source: Own study.

During the next step, the research sample is divided into two subgroups (A and B). The results of cluster analyses are presented on Figure 2.

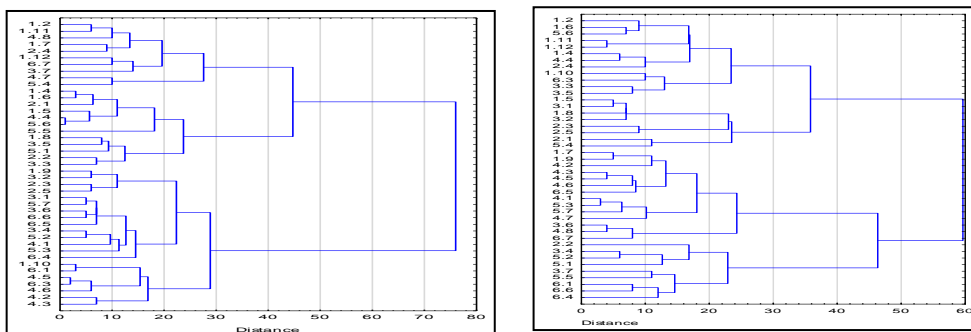
Figure 2. Cluster analysis, group A (on the left) and B (on the right), 2014



Source: Own study.

In group A, in 2014, 3 clusters can be formed, and in group B - 4 clusters can be formed (Figure 2). Similarly, in 2018, 3 clusters can be formed in each group in both groups (Figure 3).

Figure 3. Cluster analysis, group A (on the left) and B (on the right), 2018



Source: Own study.

4. Conclusions

Cluster analysis allows grouping elements into relatively homogeneous classes. The basis of grouping in most algorithms is the similarity between the elements. In the study, we conduct grouping based on features describing the responsiveness of the system. Responsiveness described 39 characteristics belonging to 6 categories - Patient Rights & Information, Accessibility, Outcomes, Range and reach of services provided, Prevention and Pharmaceuticals. The main findings from this study are as follow:

- The number of clusters is stable over time – both in 2014 and 2018, five clusters are identified;
- The number of clusters within subgroups A and B is similar and stable over time;
- The number of clusters created suggests that the responsiveness of health systems is a complex concept perceived by patients in different ways;
- There are no essential differences between countries with the system of public health and countries where health financing bases on insurance schemes.

Health care is a unique sector of the economy, characterised by complicated and multidimensional dependencies. Modern health systems face many challenges related to globalisation, the emergence of new infectious diseases, changes in people's perception of health, and the diversity of health needs. It justifies the need to intensify research on health systems to seek rational and practical solutions at all levels of health protection. The results of analyses, e.g., the InterCriteria analysis, which was used to assess similarities between countries in terms of the quality of the health care system using the Euro Health Consumer Index, can help solve these

problems (Bureva and Andreev, 2019), diagnose potential problems (Lukovnjak, 2019) and look for links between healthcare and quality of service and customer satisfaction.

Regardless of the financing system, the problem of responsiveness is not one-dimensional - patients perceive it taking into account many dimensions and not, for example, only accessibility. Actions to improve responsiveness should therefore holistically cover this problem.

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