Comparison of Health Status Indicators with Multidimensional Scaling and The Multi Objective Optimization by Ratio Analysis

Sağlık Statüsü Göstergelerinin Çok Boyutlu Ölçekleme ve MOORA Uygulaması ile Karşılaştırılması

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ABSTRACT

INTRODUCTION: Health is important factor in determining the pogress and developmental levels of countries. One of the goals of the country's health system is to raise the health level of the community as much as possible. The health performance of the community can be calculated and measured using various indicators. These are called health status indicators.

AIM: The aim of this study is to determine the position of Turkey in Organisation for Economic Co-operation and Development (OECD) countries before and after the health transition program and make net performance ranking of countries in terms of health status indicators.

METHODS: The Multidimensional Scaling (MDS) was used to determine OECD countries' position and the Multi Objective Optimization by Ratio Analysis (MOORA) method was used to calculate the net performance ranking of countries according to health status indicators.

RESULTS: According to the performance ranking analysis, while Switzerland has the best performance among 34 OECD countries in both 2002 and 2014, Turkey has the worst performance in terms of health status indicators in 2002. As a result of the MDS analysis for 2014, Switzerland and Japan are similar countries in terms of health status indicators and Turkey, Chile, Hungary, Mexico, Slovakia are similar countries.

CONCLUSION: Despite significant positive developments in terms of Turkey's health outcomes in recent years, there are still considerable differences between Turkey and developed countries. It is suggested that countries should improve their own models in order to achieve excellence in health systems, besides benefiting from each other's experiences based on good examples.

Keywords: OECD, health status, health management, MOORA, MDS

ÖZ

GİRİŞ: Sağlık, ülkelerin kalkınma ve gelişim düzeylerinin belirlenmesinde önemlidir. Ülkelerin sağlık sisteminin hedeflerinden biri, toplumun sağlık düzeyini olabildiğince artırmaktır. Topluluğun sağlık performansı çeşitli göstergelerle hesaplanabilir ve ölçülebilir. Bunlara sağlık statüsü göstergeleri denir.

AMAÇ: Bu çalışmanın amacı, sağlıkta dönüşüm programı öncesi (2002) ve sonrası Ekonomik İşbirliği ve Kalkınma Örgütü (OECD) ülkeleri arasında Türkiye'nin konumunu belirlemek ve sağlık göstergeleri açısından ülkelerin net performans sıralamalarını yapmaktır.

YÖNTEM: OECD ülkelerinin konumunu belirlemek için Çok Boyutlu Ölçeklendirme (MDS), ülkelerin net performans sıralamasını hesaplamak için MOORA yöntemi kullanılmıştır.

BULGULAR: Performans sıralamasına göre, 2002 ve 2014 yılları arasında, 34 OECD ülkesi arasında İsviçre en iyi performansa sahipken, Türkiye 2002 yılında sağlık statüsü göstergeleri açısından en kötü performansa sahiptir. MDS analizi sonucunda, İsviçre ve Japonya benzer ülkelerdir. Türkiye, Şili, Macaristan, Meksika ve Slovakya ise benzer diğer ülkelerdir.

SONUÇ: Son yıllarda Türkiye'nin sağlık sonuçları açısından önemli olumlu gelişmelere rağmen, Türkiye ile gelişmiş ülkeler arasında halen önemli farklılıklar bulunmaktadır. Sağlık sistemlerinde kusursuzluk elde etmek için ülkelerin kendi modellerini geliştirmeleri ve birbirlerinin deneyimlerinden yararlanmaları önerilmektedir.

Anahtar kelimeler: OECD, sağlık statüsü, sağlık yönetimi, MOORA, MDS

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INTRODUCTION

The most often quoted definition of health is that of the World Health Organization (WHO): "Health is a state of complete physical, mental, and social well-being, and not merely the absence of diseases and infirmity (World Health Organization, 1958). The health level of the people in any country has great effect on productivity, active involvement in the working life and welfare. When people are healthy, they can be productive in businss and contribute to the country's capital. From a macro perspective, societies with good health status produce more and generate more income (Zweifel et al., 2009). So, health is accepted as an important parameter that determines the level of development of countries as well as an important investment area for human capital together with education (Goldsmith, 1972). For this reason, the health systems, which has an impact on the future of the society, has been extensively studied around the world since 1960. New applications and system changes have been made to develop the health systems in many countries in the world (Kocak, 2011). According to the World Health Organization [WHO]; health system has been described as consisting of organizations, institutions, resources, and people whose primary purpose is to improve our health. A health system needs staff, funds, information, supplies, transport, communications, and overall guidance and direction. A health system needs to provide services that are responsive and financially fair, while treating people decently (Alva et al., 2009).

The main objective of a good health system is to improve people's lives tangibly every day. The health system is the means to achieve better health outcomes, such as better child survival through immunization, improved maternal health through emergency obstetric care and birth spacing, and lower incidence rates of human immunodeficiency virus (HIV), malaria, and other infectious diseases through prevention (Alva et al., 2009).

According to the WHO, the main objectives of health systems are to upgrade the health status, and respond to sanitary requirements of the society, and to establish a fair system for financing health systems (OECD, 2008). These three objectives give us a framework for the main objectives of health systems and the success of the health system implemented by countries is also measured by their attainment of these three main objectives using a variety of measurement tools such as time series analysis, various international comparisons, cause analysis, and panel data studies, etc.

The variables that can be used when evaluating the success of countries' health systems are summarized in Table 1.

Table 1: Health System Success Measurement Indicators

Good Health Status	Responsiveness	Fair Financing
Measuring health status with various indicators that show the health level of the society.	It is the measure of how much the community fulfills expectations from health services.	The method of financing health care services is the measurement of indicators related to reimbursement models and the sustainability of the system.
Indicators • Life expectancy at Birth • Satisfaction from Health Services • Perceived Health Status (good-very good) • Neonatal mortality rate (per 1000 live births) • Maternal mortality ratio (per 100 000 live births) • Age-standardized mortality rate (per 100 000 population)-Cardiovascular diseases • Age-standardized mortality rate (per 100 000 population)-Cancer • Age-standardized mortality rate (per 100 000 population)-Diabetes • Age-standardized mortality rate (per 100 000 population)-Chronic respiratory diseases…….	*Indicators* • Health Satisfaction Level • Equity between regions and classes at the point of resource use in health care….	*Indicators* • Share of health expenditure in Gross domestic product (GDP) • The share of the public in total health expenditures • Private share in total health expenditures • Total health expenditure per capita • Financing method of health expenditures • Share of out-of-pocket expenditures in health expenditures • Balance between health expenditures and economic growth………
Source: Created by the authors		

The aim of this study is to determine the position of Turkey in OECD countries before and after the health transition program (since 2003) and make net performance ranking of countries in terms of health status indicators with reference to both 2002 and 2014. The reason for the selection of the year 2002 in the study is the year before the start of significant changes in the health care system of Turkey as part of the Health Transformation Program. The reason for the election of the year 2014 is that it is the year when the most recent data is available. Of course, changes in health status over the past 12 years cannot be explain with only the Health Transformation Program in Turkey. However, it is important to see the changes in the specified dates.

METHODOLOGY

The study was conducted to cover all 34 OECD (Organisation for Economic Co-operation and Development) countries. The universe of the study was naturally OECD countries. The OECD community includes countries with a high level of development and countries with the highest expenditure in terms of health spending such as the United States. Indicators related to the health status of these countries have been drawn for each country separately from the statistics available in official websites OECD and WHO. These accessible data are published on a regular basis annually. The survey was conducted in 2017. It is in the form of two cross-sectional studies for 2002 and 2014. MDS and MOORA methods were used in the study.

The Multidimensional Scaling (MDS) was used to determine OECD countries' position and the Multi-Objective Optimization by Ratio Analysis (MOORA) method, which is one of the multi-criteria decision for formulating techniques, was used to calculate the net performance ranking of countries according to health status indicators used in the study.

MDS is a statistical method for revealing the relationships between objects by using distances between them in cases where the relations between objects are not known but the distances between them can be calculated (Kalaycı, 2014). Multidimensional scaling (MDS) is one of the techniques of interdependence that is used when any or all of the variables of a group are not dependent on one another and cannot be explained by another, when they are involved in the mutual relationship among all variables. There are complicated mathematical, geometric and statistical operations that can produce models that visually reveal the structure of the verb (Kurt, 1992).

The MDS method solves the problem by using the distance matrix. It is important to calculate the distance matrix appropriate to the data type. If the data are spaced or proportionally scaled, the difference matrix is calculated as Euclidean distance, Quadratic Euclidean distance, Block, Minkowski, Chebychev, Customized distances. Euclidean and Quadratic Euclidean distance n * p is a dimension of a data matrix and j. Is a measure that determines the distances between units directly in the unit of measure or in the form of Quadratic distances. Euclidean distance, i. and j. The squares of the differences of the units are found by taking the square root of the sum of the differences (Kalaycı, 2014).

The desired solution in MDS analysis is a solution of three or less dimensions. Thus, a graphical representation is obtained that includes the traceable and explorable form of units and objects.

The desired stress statistic in the MDS solution is close to zero. Dimensional analyzes with near-stress values are considered appropriate (Kalaycı, 2014). According to this;
- Stress ≥ 0.20 Poor compliance
- 0.10 ≤ Stress <0.20 Moderate compliance
- 0.05 ≤ Stress <0.10 Good fit
- Stress <0.05 Perfect fit
- 0 <Stress <0.025 Full compliance.

MOORA (Multi-Objective Optimization on the basis of Ratio Analysis) is a process of simultaneously optimizing two or more overlapping qualities or objectives under certain constraints (Brauers and Zavadskas, 2009).

The MOORA method is based on the grouping of different predictions. The method starts with a matrix in which all alternatives and answers to the criteria are found. The matrix is shown as "xij". Xij expression, i. j. Alternate response / response.

The MOORA method consists of two basic parts, the ratio system and the reference point approach. With MOORA method, it is possible to solve the problems with the aid of both the matrix calculator and the help of Excel. The solution in both methods is quite simple and understandable (Şimşek et al., 2015).

Data

The data were obtained from WHO database and OECD health data (OECD, 2016; WHO, 2016). The following variables (indicators) were used in the study to represent the health status of 34 OECD countries. Also the database related to the indicators used in the study is presented in Annex 1.
- Life expectancy at birth (2002 and 2014)- Years
- Satisfaction level from health services (2014)- %
- Perceived health status (good-very good) (2002 and 2014)-%/total population
- Neonatal mortality rate (per 1000 live births) (2002 and 2014)
- Maternal mortality ratio (per 100 000 live births) (2002 and 2014)
- Age-standardized mortality rate (per 100 000 population)- Cardiovascular diseases (2002 and 2014)
- Age-standardized mortality rate (per 100 000 population)- Cancer (2002 and 2014)
- Age-standardized mortality rate (per 100 000 population)- Diabetes (2002 and 2014)
- Age-standardized mortality rate (per 100 000 population)- Chronic respiratory diseases (2002 and 2014).

The analysis of the MDS method, which is used to see the positions of the countries according to each other for 2014 data in the study, was performed with the SPSS 20 package program and The MOORA performance ranking according to the health status indicators of the countries have been conduct by using the Microsoft Excel program. In MOORA analysis, the weights of each variable were considered equal.

RESULTS

The performance ranking of OECD countries according to the health status indicators used for 2002 and 2014 are shown in Table 2.

Table 2: Final Sorting for 2002 and 2014 Years

	2002			2014	
Rank	Country	MOORA Score	Rank	Country	MOORA Score
1	Switzerland	-0.59825937	1	Switzerland	-0.406927631
2	Japan	-0.88069872	2	Iceland	-0.50661135
3	Australia	-0.90741325	3	Finland	-0.602146276
4	Canada	-1.06957532	4	Sweden	-0.84274721
5	Iceland	-1.11921309	5	Japan	-0.852078747
6	France	-1.42866707	6	Luxembourg	-1.575714997
7	Sweden	-1.50599663	7	Norway	-1.582318668
8	Israel	-1.58096578	8	Australia	-1.63425736
9	Spain	-1.68245297	9	France	-1.66933864
10	New Zealand	-1.84056786	10	Slovenia	-1.897611602
11	Italy	-1.91786831	11	Austria	-2.120447887
12	Norway	-1.93629889	12	Belgium	-2.417895853
13	Finland	-1.99017687	13	Italy	-2.430643994
14	Luxembourg	-2.22507477	14	Israel	-2.485899475
15	Belgium	-2.36822871	15	Netherlands	-2.592806522
16	United States	-2.58166303	16	Canada	-2.610160303
17	Austria	-2.63307577	17	Germany	-2.658091425
18	Netherlands	-2.69665902	18	Spain	-2.930558486
19	United Kingdom	-2.70351839	19	Ireland	-2.989565526
20	Chile	-2.75191035	20	New Zealand	-3.295013787
21	Greece	-3.10213748	21	United Kingdom	-3.344812891
22	Germany	-3.32587875	22	Czech Rep.	-3.788214953
23	Ireland	-3.69961597	23	Greece	-4.188617799
24	Denmark	-3.71360262	24	S. Korea	-4.265276313
25	Portugal	-3.98387805	25	Denmark	-4.353049237
26	S. Korea	-4.26045751	26	Estonia	-4.677949694
27	Slovenia	-4.7333216	27	Portugal	-5.134150815
28	Czech Rep.	-8.37659661	28	Poland	-5.915606449
29	Poland	-8.79000908	29	Slovak Rep.	-6.209057613
30	Mexico	-9.23752133	30	United States	-6.277610589
31	Slovak Rep.	-11.1660389	31	Chile	-9.333693102
32	Hungary	-12.0290201	32	Hungary	-10.08617312
33	Estonia	-13.2035824	33	Turkey	-13.29841945
34	Turkey	-19.3781871	34	Mexico	-21.06466492

According to the MOORA results; Switzerland is the country with the most successful health status according to the MOORA rankings, for both 2002 and 2014 years. Compared with 2002, Slovenia is the country with the highest increase in the ranking. Slovenia ranked 27th among 34 countries in terms of health status indicators in 2002, but it rose to 17th place in 2014. Countries ranked higher than in 2002, after Slovenia, respectively, are Finland (+10), Luxembourg (+8) and Estonia (+6).

Compared with the MOORA ranking in 2002, the highest drop in the ranking in 2014 was the USA. This is quite remarkable for the United States, which has had serious debate over the health system in recent years. As known, USA is the first country which have biggest health expenditures in the world (health spending per capita is about 10 thousand dollars, the OECD average is 3,500 dollars) and the biggest share of health expenditures in the national income (about 18%, OECD average approx. 9%). However, the health status indicators, a parameter used to assess the success of the US health care system, do not have the same success. Even compared to 2002, the USA has fallen 14 ranks among 34 OECD countries.

Compared to the MOORA results for 2002 and 2014, the countries with the highest drop in performance rankings after the USA are Canada, Chile and New Zealand respectively. The underlying reason for this is the positive health outcomes achieved in the health field in recent years, especially in the developed European countries and the Scandinavian countries. For example, life expectancy and satisfaction with health care are at high levels in these countries.

One of the remarkable points in results of the analysis is that performance rankings of Switzerland, Denmark, Poland, Hungary and Turkey have not changed of changed only ± 1 step from 2002 to 2014. Within this group, Switzerland should be assessed separately. Because in both 2002 and 2014, Switzerland ranks first. However, the situation is not the same in Hungary and Turkey in particular. Hungary ranked 32 out of 34 countries both in 2002, and 2014.

During this period, the life expectancy in Hungary has been extended by 2.5 years, the infant mortality rate has declined from 6.1 to 3.5 per 1000 live births, but the perceived health status has increased from 45 to 57, but the achievements still remain below those of other OECD countries. Similar comments can be made for Turkey. Compared to 2002, life expectancy at birth in Turkey in 2014 has increased by about 7%, and decreases in infant (50%) and maternal mortality (80%), age-adjusted cardiovascular disease, and cancer (28 and 7%) rates were realized. Although Turkey's achievements in health status indicators are at a serious level, they are still behind other OECD countries.

Finally, MDS analyzes have been conducted for 9 health status criteria in 34 countries for the year 2014. There are two reasons why only 2014 MDS results are included in the study. First of all, 2014 data contain the most up-to-date information, so to see the closeness and distance of the countries in the most up-to-date manner. The second one is to compare the previous results with those of 2014 MOORA data and to analyze ech year's data separately and not to extend the work in terms of the reader. As a result of the analysis, it is seen that countries with similar positions relative to each other were gathered together in Figure 1. MDS stress statistic has been found as 0.19, that refers to moderate compliance. MDS analysis and MOORA results are similar to each other. Countries close to each other in the MOORA sequence are located close to each other in the two-dimensional plane obtained as a result of MDS analysis.
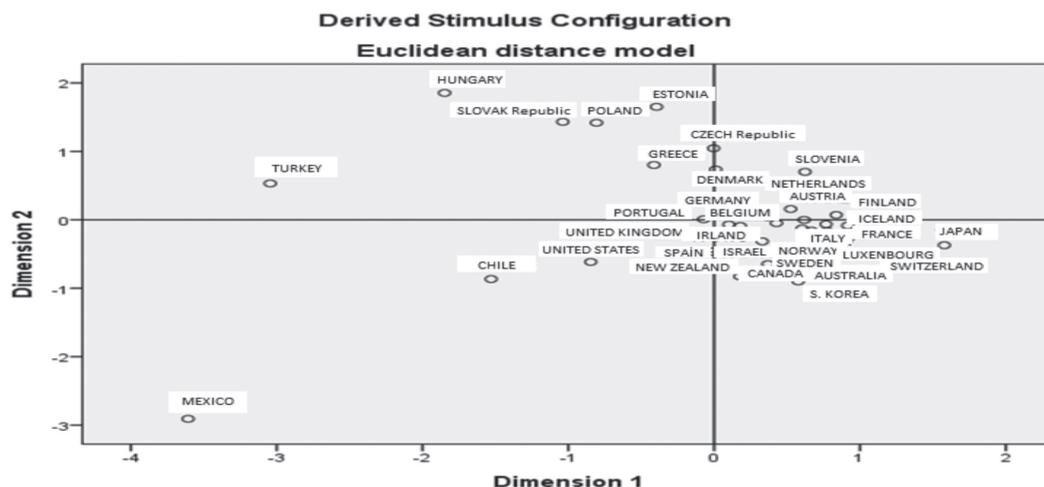

Figure 1: MDS Results for 2014 Year

DISCUSSION

The aim of this study was to determine the position of Turkey among OECD countries before and after the health transition program (since 2003) and make net performance ranking of countries in terms of health status indicators according to both the 2002 and 2014 years. According to the study results there are many improvements in health status indicators in Turkey such as life expectancy, mortality rates and etc. But compared with other OECD countries, Turkey is still in the last ranks among 32 countries in terms of some health status indicators. There could be two main reasons for this. Firstly, despite the developments in Turkey, more improvement in the health status has been made in other countries. Secondly, despite the positive developments in Turkey's health status have been started to be experienced, Turkey still ranks behind many countries. When evaluated on the basis of indicators, Turkey is one of the countries achieving the highest progress within the last years which suggests that the latter assumption is more valid for Turkey.

Cross-national comparison studies provide opportunities for gaining insights into many issues that are of major concern to many countries, learning how other countries have dealt successfully with these issues. For instance, Brown (2003) has investigated the health systems of Canada, France, Germany, and Great Britain (United Kingdom) in point of social security coverage, funding, costs, providers, integration, markets, analysis, supply, satisfaction, and leadership. By comparing the health systems of these 4 countries, Brown has presented important recommendations for the USA health care system. This is an indication that cross-country studies are particularly important for the development of the country's health system (Brown, 2003). Starfield has compared ten western industrialized nations in terms of 12 health indicators (infant mortality, life expectancy, and age-adjusted death rates), and the satisfaction of their populations in relation to overall costs of the systems and found that the United States had low ratings on all measures. In contrast, Canada, Sweden, and the Netherlands had generally high ratings for all indicators (Starfield, 1991). The results obtained in our study are similar, especially for the Northern countries such as Sweden and the USA, although some 25 years have elapsed.

In another study, Lian (2008) has discussed theories of globalization and convergence in tandem with a cross-national comparison of changes in primary health care between 1990 and 2005 in three European countries: Britain, Norway and the Czech Republic. It has been found that the influence of local factors seems to be stronger than the influence of global factors on health indicators (Lian, 2008). Kuo (2009) compared health indicators including expenditures, mortality rate and life expectancy of Taiwan, Japan, US and UK's health insurance system. According to the study results, while USA was the highest spending country except social health expenditure, it was not ranked as the first for the life expentancy and infant mortality rate, which are accepted as indicators of health status. The results obtained in this study are similar with this study. USA, the country with the highest health expenditure in the world, did not rank first regarding health status indicators examined in this study (Kuo, 2009).

In another study, Turkey's performance and position has been examined in terms of indicators of maternal mortality rate, infant mortality rate and low weight newborns rate among OECD countries. According to the obtained results Turkey and Mexico are in a worse level and differ from other countries in terms of overall mortality rate, low-weight birth s rate and newborn mortality rate (Rehimli et al., 2008).

Another remarkable point of the study is the separate place of Turkey and Mexico from other OECD countries in terms of health status indicators. Even though there are changes in the health indicators used in studies done in the literature (such as women's health, health expenditure, health status etc.), these two countries have generally been separated from other countries. In our study, in terms of health status indicators of 2014, Turkey and Mexico are separated from other countries. In 2008, the similarity and difference study carried out by Ersöz et al. the authors analyzed the health status and health expenditures for OECD countries. In the study it has been found that Mexico is the country with the most similar to Turkey, while Norway and Australia are the most different ones from Turkey (Ersöz, 2008). In our study, according to the results of MOORA performance analysis of 2014, Norway ranked 7th in 34 OECD countries and Australia in 8th. Also, Turkey ranked 33th among 34 countries being above only Mexico. Although the method, the year and the variables used are different, in our study our results are similar to those obtained obtained in Ersöz's (2008) study.

When the results obtained from the study evaluated, after the Turkish Health Transformation Program in 2002, important developments in Turkey's health status indicators have been achieved, but it has been concluded also that the international place of Turkey regarding health status indicators is still behind many developed countries. In addition, when the results of the studies cited in the literature and this study, were combined, although the performance or benchmarking method, the year or the variables examined changes, the position of Turkey with respect to other countries in terms of health indicators such as health status, expenditures, human sources etc. is almost the same with the past.

CONCLUSION

The main purpose of health systems is to provide the health services that society needs, at high quality, at the right time and at the lowest possible cost. Health is an important parametre for both human capital investment and the level of development of countries. Development levels of countries are also measured by their success in health status. The aim of health policies and health reforms is to raise the health status of the people. A variety of benchmarking, ranking, effectiveness, performance and cause-and-effect analyzes are extremely important in assessing the health reforms and health systems of countries using health status indicators. These analyzes will guide the future interventions for the countries.

ANNEX 1

OECD	HEALTH STATUS INDICATORS. 2002							
	Life expectancy at Birth	Neonatal mortality rate (per 1000 live births)	Maternal mortality ratio (per 100 000 live births)	Age-standardized mortality rate (per 100 000 population)-Cardiovascular diseases	Age-standardized mortality rate (per 100 000 population)-Cancer	Age-standardized mortality rate (per 100 000 population)-Diabetes	Age-standardized mortality rate (per 100 000 population)-Chronic respiratory diseases	Perceived Health Status (good-very good)
	MAX	MIN	MIN	MIN	MIN	MIN	MIN	MAX
Weights	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5
Australia	79.9	3.4	9	154.7	130	10.2	26.1	84
Austria	78.7	3	5	215.7	132.5	15.5	19.3	71.2
Belgium	78	2.8	9	172.2	149.7	9.3	35	73.5
Canada	79.5	3.8	9	150.8	142.1	14	25	88
Chile	77.8	5.3	31	157.2	133.5	18.3	27.6	52.6
Czech Rep.	75.3	3.5	7	341.2	181.2	8.5	13.8	59
Denmark	77	3.3	9	189.1	175.3	15	40.7	77.6
Estonia	71.2	5.3	26	446.4	159	6	13.7	49.8
Finland	78.1	2.3	5	212.2	115.1	6.3	14.6	69.1
France	79.2	2.7	12	131.2	151.5	9.4	16	67.6
Germany	78.8	2.7	8	221.5	143.9	12.3	19.3	60
Greece	79	4.7	4	235.7	134.2	4.7	29.6	77.7
Hungary	72.5	6.1	15	387.3	206.4	13.2	23.3	45
Iceland	80.4	1.8	5	167.6	131.7	4	20.9	78.7
Ireland	77.4	3.7	9	228	153	7.8	41.2	82.8
Israel	79.3	3.3	8	146.6	127.5	31.1	27.1	76.8
Italy	80	3.1	5	168.8	133	13.8	21.3	57.4
Japan	81.8	1.7	10	111.8	123.1	4.9	16.3	38.7
Luxembourg	78.3	2.2	13	186.2	139.8	6.8	27.6	72.3
Mexico	75	8.6	77	156.1	88	78.9	37.1	65.6
Netherlands	78.4	3.7	14	182	159.3	12.6	28.1	76.3
New Zealand	78.7	3.4	12	181.7	144.6	14.4	29.1	89.6
Norway	78.9	2.5	7	185.8	138.1	7.4	22.9	73.9
Poland	74.5	5.2	8	349.7	171.6	9.7	25	54.3
Portugal	77.2	3	13	228.1	128.1	23.3	28	45.3
S. Korea	77.1	2.9	16	183.9	152.6	30.6	38.9	44
Slovak Rep.	73.7	6.6	8	401.7	175.7	10.7	16.2	52
Slovenia	76.6	3	12	240.1	162	15.9	22.1	53.6
Spain	79.5	3.9	5	146.1	132.7	10.7	36.4	64.8
Sweden	79.9	2.2	5	189.3	121.6	8.5	15.2	71.7
Switzerland	80.4	3.4	7	154.2	126.9	10.2	16.1	84
Turkey	71.2	18	79	425.4	145.4	18	86	55
United Kingdom	78.2	3.6	12	195.8	146.2	5.7	33.6	74.8
United States	77	4.6	12	202.4	139.9	16.7	36.8	88.2

ANNEX 1

OECD	HEALTH STATUS INDICATORS. 2014								
	Life expectancy at Birth	Satisfaction from Health Services	Perceived Health Status (good-very good	Neonatal mortality rate (per 1000 live births)	Maternal mortality ratio (per 100 000 live births)	Age-standardized mortality rate (per 100 000 population)-Cardiovascular diseases	Age-standardized mortality rate (per 100 000 population)-Cancer	Age-standardized mortality rate (per 100 000 population)-Diabetes	Age-standardized mortality rate (per 100 000 population)-Chronic respiratory diseases
	MAX	MIN	MIN	MIN	MIN	MIN	MIN	MAX	MAX
Weights	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1
Australia	82.8	80	85	2.2	6	92.4	111	9.5	22.2
Austria	81.5	89	69	2.1	4	145.9	122	13.5	15.3
Belgium	81.1	89	74	2.2	7	111.1	130.3	6.7	25.7
Canada	82.2	75	89	3.2	7	88.6	119	9.7	22.5
Chile	80.5	35	59	4.9	22	115.1	115.3	15	26
Czech	78.8	75	60	1.8	4	239	142.2	11.1	15.4
Denmark	80.6	85	72	2.5	6	108.3	155.7	12.4	35.9
Estonia	77.6	51	53	1.5	9	272.1	142.4	5.5	9.5
Finland	81.1	69	65	1.3	3	145.9	102.2	4.2	12.6
France	82.4	81	67	2.2	8	85.6	132.2	7.1	12.4
Germany	81.0	85	65	2.1	6	142.7	122.2	10.3	19.4
Greece	81.0	35	74	2.9	3	175.9	116	5.6	27.6
Hungary	74.6	60	57	3.5	17	293.3	184	12.3	27.2
Iceland	82.7	73	77	0.9	3	103.3	118	5.2	22.7
Ireland	81.4	67	82	2.3	8	118.7	125.2	6.5	25.5
Israel	82.5	72	80	2.1	5	86	110.3	20.3	18.6
Italy	82.7	48	66	2.1	4	105.5	116.1	11.2	15.2
Japan	83.7	72	35	0.9	5	81.6	104.3	3.9	15.8
Luxembourg	82.0	88	72	0.9	10	107.9	124.3	6.3	20.4
Mexico	76.7	55	65	7	38	148.3	72.4	90.5	34
Netherlands	81.9	86	76	2.4	7	104.8	146.7	7.9	22.5
New Zealand	81.6	84	90	3.1	11	103.8	112.8	10.7	23.8
Norway	81.8	82	76	1.5	5	111.5	121.6	7.2	24.8
Poland	77.5	43	58	3.1	3	253.4	149.7	9.4	20.8
Portugal	81.1	62	46	2	10	113.1	130	17.6	22
S. Korea	82.3	70	35	1.6	11	92.3	115.7	15.9	19.4
Slovak Rep.	76.7	56	66	4.2	6	305.9	139.6	6.7	13.2
Slovenia	80.8	81	65	1.4	9	141.2	150.7	3.6	11
Spain	82.8	67	72	2.8	5	96.8	119.8	8.1	26.6
Sweden	82.4	78	81	1.6	4	132	110.3	8.2	15.2
Switzerland	83.4	94	81	2.7	5	97.9	103.8	6.4	12.9
Turkey	75.8	71	68	7.1	16	310.3	134.2	13.2	54.1
United Kingdom	81.2	77	74	2.4	9	111.8	130.4	4.2	30.5
United States	79.3	77	88	3.6	14	136	121.2	13.4	37

As Blum points out, health is not a multifaceted concept influenced by inheritance, physical and social environment, socio-economic conditions, and individual lifestyle-behavior, not just health care. For this reason, the health status indicators of countries are indirectly affected by these parameters. It is therefore useful to consider all the factors that affect health in order to improve the health status of the country, which is the main objective of the health systems.

Despite significant positive developments in terms of Turkey's health outcomes in recent years, there are still considerable differences between Turkey and other developed countries. It is suggested that countries should improve their models in order to achieve excellence in health systems, as well as benefit from each other's experiences based on good examples. Also it is suggested that decision makers should consider the health system as a macro size organization together with the social dimension of health and develop their policies accordingly.

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