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Assessment of Emerging Countries in terms of Health Indicators

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In recent years, sustainable development concept has gained importance for countries. Health indicators, especially, are very important for monitoring progress in social dimension of sustainable development. The purpose of this study is to assess emerging countries in terms of health indicators using multivariate statistical analysis for the year 2014. In this study, data set includes 22 emerging countries with nine health indicators and multidimensional scaling is employed as method. According to results obtained from analysis, South Africa is identified as the most dissimilar to other countries. Similarly, India, Indonesia are dissimilar countries. On the other hand, Greece, Hungary, Poland, Czech Republic, Korea, Qatar are very similar countries as a group. The overall findings show that income level of the countries' is very important factor in terms of health indicators and emerging countries need some improvements. Also, they should consider health-related issues carefully and provide more financial support to the society.

JEL Codes: I14 and C18

Field of Research: Economics - Health Economics

1. Introduction

Over the last decade sustainable development has gained importance and become one of the most crucial concept in the world. Sustainable development can be defined in many ways but commonly used form is that "Sustainable development is development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs" (WCED 1987). In this contex, sustainable development has three dimensions which are economic, social and environmental base and all three dimensions should be considered as a whole.

Social dimension of the sustainability is very important for the society as it covers different sub-dimensions regarding social life of the people. According to The United Nations (UN) Commission for Sustainable Development Framework; poverty, equity, health, education, demographics, housing, security are the sub-themes in social dimension and their indicators are used as means for evaluating sustainable development (UN 2007). Accordingly, health indicators and health policies followed by goverments have been playing crucial role to monitor sustainable development process. Millennium Development Goals (MDGs) and Sustainable Development Goals (SDGs) are especially important frameworks in order to evaluate sustainable deveopment. First, in 2000, UN Millennium Declaration was released and 189 nations endorsed a framework. In accordance with this declaration, eight MDGs were

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established, with targets for 2015, and indicators to monitor progress. These goals, notably, cover social and environmental targets and three of them are related to health issues (UN 2016).

Besides, again, 2030 Agenda for Sustainable Development is launched by UN. According to this, the new Agenda calls on countries to begin efforts to achieve 17 Sustainable Development Goals (SDGs) over the next 15 years. SDG3 of the 2030 Agenda for Sustainable Development is devoted to "ensure healthy lives and promoting well-being for all at all ages". In this contex, this goal aims to the reduction of global maternal mortality, the end of preventable deaths of new-borns, the end of the epidemics of AIDS, tuberculosis and malaria, as well as the reduction by one third of premature mortality from non-communicable diseases (UN 2017).

In this context, the purpose of this study is to assess and compare emerging countries in terms of health indicators using multidimensional scaling (MDS). Accordingly, the remainder of the study is organized as follows: Section 2 provides literature review. Section 3 presents general overview about emerging countries. Data set, variable description and methodology are briefly explained in Section 4. Additionally, findings of this study is provided in this section. Last section is dedicated to concluding remarks and discussion.

2. Literature Review

In the literature, there have been several studies examining health indicators, health expenditure and health status of countries'. Even though the literature has focused on status of the developed countries' due to existing of data, there have been various studies regarding health expenditure and health indicators of the emerging or developing countries'. Some of these are as follows:

Baltagi and Moscone (2010) examined the long-run economic relationship between health care expenditure and income using a panel of 20 OECD countries for the period 1971-2004. Based on results, they found that health care is a necessity rather than a luxury and elasticity is much smaller than that estimated in previous studies.

Klomp and Haan (2010) investigated the health status of 171 countries by using factor analysis and cluster analysis. They constructed new measures that are related to the health of individuals and the quality of the health services. Based on these measures, they obtained new rankings and also they discriminated the countries in six groups by employing cluster analysis.

Xu et al (2011) investigated factors affecting total health expenditure in developing countries utilizing panel data analysis. They explored that these countries have great variation which lies from less than 5% to 15% in health expenditure as a share of Gross Domestic Product (GDP) and also, income, demographic factors and health system characteristics are the leading factors. Moreover, they found that health expenditure in general does not grow faster than GDP after considering other factors.

Novignon et al (2012) studied the effect of health care expenditure on population health status and examined the effect by public and private expenditure sources using panel data analysis including 44 countries in sub-Saharan Africa region. Based on findings, it has been seen that health care expenditure significantly affects health status of the countries'. Also, increasing in

health care expenditure positively influences life expectancy at birth, reducing death and infant mortality rates.

In another study, Lorcu et al (2012) compared European Union (EU) members and Turkey in terms of health-related MDGs using Cluster analysis and Multidimensional scaling (MDS). In this study, by employing MDS, similar and dissimilar countries regarding health indicators are mapped in multidimensional space. Besides, findings have been verified with cluster analysis. Lorcu and Bolat (2012), also, compared EU member countries and candidate countries in terms of health indicators using logistic regression and discriminant analysis. According to results obtained from analysis, “health expenditures per capita” and “life expectancy” have been determined as discriminator variables and it has been seen that member countries, Romania and Bulgaria, and candidate country, Turkey, are similar in terms of health indicators.

Anton and Onofresi (2012) investigated the relationship between the health status and the health related indicators for selected countries from Central and Eastern Europe. In this study, under-5 (child) mortality rate is employed as dependent variable and 18 countries are examined using regression analysis with total of four independent variables that are per capita GDP, share of total health expenditure in GDP, the number of physicians per 1,000 people and the percentage of population living in urban areas. According to results, Romania has the lowest level of health expenditure as percentage of GDP in Europe. Also, another finding is that GDP per capita and health expenditure as a percent of GDP are the most important factors affecting under-5 (child) mortality rate.

Grigoli and Kapsoli (2013) have measured public expenditure inefficiency in the health sector for a sample of 80 emerging and developing economies for the period 2001-2010. They have found that African economies have the lowest efficiency, whereas Western Hemisphere and Asian economies are relatively more efficient.

Mackenbach and McKee (2013) examined health policies of European countries in ten different areas and also they tried to explain differences of implementation of health policies in these countries considering political, economic and social factors. In this study, regression analysis was used with 27 indicators. They found that survival/self-expression values and ethnic fractionalization are the main predictors of the health policy of the countries’. In additon, adolescent fertility rate and maternal mortality rate are high in many countries in the Western Balkans, Central and Eastern Europe and the former Soviet Union. Besides, in the Western Balkans, Slovenia differs as a country that performs better than the others,

Costantini et al (2015) examined generally the epidemiological profile and the status of the epidemiological research in 32 European countries, namely the Western European countries, the Balkan countries and the Baltic countries. In this study, authors stated that life expectancy has steadily increased in the Balkan countries. Another result reached is that epidemiological training, research and workforce in the Balkan countries should be strengthened while developments in public health education have taken place recently.

Bedir (2016) examined causal relationship between income and health expenditures in emerging markets in Europe and Middle East African and Asian countries for the period from 1995 to 2013. According to the empirical results, income is an important factor in explaining the difference in healthcare expenditures among countries. For that reason, it seems that increase in income level encourages healthcare expenditure for some of the emerging countries.

A recent study of Khan et al (2016) investigated the model regarding determinants of health care expenditures. Moreover, they studied on causal relationship between healthcare and income per capita using ordinary least square and Engle-Granger models for the period 1981-2014 in Malaysia. Income, population structure and population growth are identified as the significant factors to explain variations in health care expenditures. Besides, they found that income elasticity for health care expenditure is 0.99 which means that health care is a necessity. In another study regarding Malaysia, Tang (2010) examined whether there is relationship between health spending, income, and health price using Granger causality test, multivariate cointegration and error-correction analysis. According to the results, it has been seen that health spending, income and health price are bi-directional Granger causality in the long-run.

3. Emerging Countries

Today, countries can be classified as three groups in terms of their economic powers: Advanced, emerging and frontier economies[1] (MSCI 2016). Emerging countries (EC) generally include (nonadvanced) high-income and middle-income countries with a record of significant access to international financial markets. Frontier countries can be defined as that are usually smaller and less financially developed than emerging markets, and have more limited access to international capital markets (Huidrom et al 2016).

Emerging countries are fast-growing economies in the world and they should be monitored carefully because they affect whole economic system critically. On the other hand, there have been various classifications regarding emerging countries in the literature. For example, the BRIC (Brazil, Russia, India, China) is the most important group in emerging countries and it has been playing very crucial role in global economy. This acronym was originally coined in 2001 to highlight the exceptional role of important emerging economies (O'Neill 2001). BRIC countries have certain characteristics that are as follows:

1. The outstanding size of their economies,
2. Strong growth rates, leading to increasing significance in world economy, and
3. The demand for a stronger political voice in international governance structures, which corresponds to their economic status. Other emerging countries are revealing one or two of these characteristics (Morazan et al 2012).

Besides, The BRIC occupy 26% of the world's land coverage, have 2.86 billion inhabitants altogether (45% of the world's population), 1.43 billion of them belong to the economically active population, which represents 44% of the global labor force (Slobodnikova and Nagyova 2011).

Later, in 2010, South Africa joined the group, which was then referred to as BRICS. They now account for two-thirds of emerging market activity and more than one-fifth of global activity—as much as the United States and more than the Euro Area—compared with less than one-tenth in 2000. It has to be noted that the economic size of BRICS is much larger in terms of PPP (purchasing-power-parity) adjusted GDP (Gross Domestic Product). According to this, The BRICS constitute about 30 percent of global activity while the United States constitutes only about 16 percent. (Huidrom et.al., 2016). Apart from this group in emerging countries, there have been other groups such as CIVETS (Colombia, Indonesia, Vietnam, Egypt, Turkey and South Africa) and Next Eleven (Bangladesh, Egypt, Indonesia, Iran, Mexico, Nigeria,

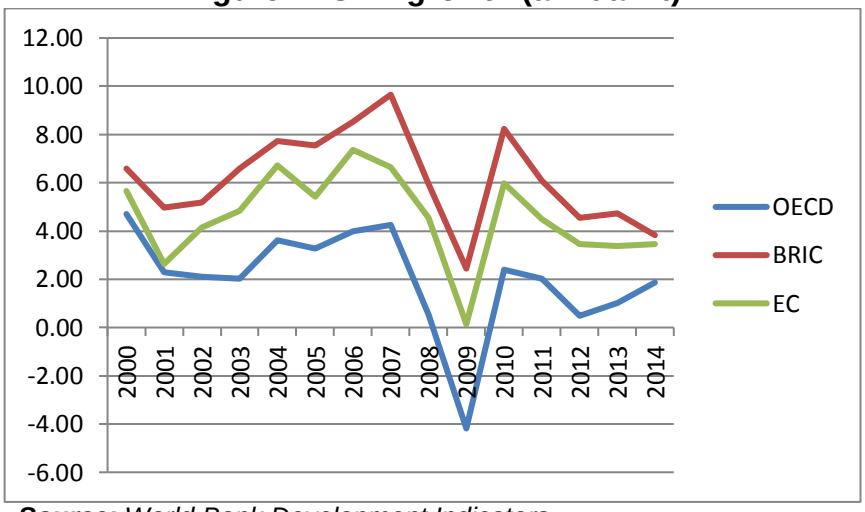
Pakistan, Philippines, Turkey, South Korea and Vietnam). But unlike BRIC, these countries are not meeting all three above mentioned conditions (Morazan et al 2012).

On the other hand, Organisation for Economic Co-operation and Development (OECD) encompasses many of the world's most advanced countries and today all member countries have high income level, except Mexico and Turkey (OECD 2016). This organization has 34 member countries[2], however in this study, 8 of them are considered as emerging countries based on MSCI Emerging Markets Index. Therefore when OECD, emerging countries and the BRIC are compared in the following OECD group is regarded as 26 member countries.

Based on literature review, it has been determined that there is relationship between health expenditure and health indicators of the countries'. Besides, it has been found that health expenditure as a share of GDP is one of the most important indicator in determining health status of the countries'.

From this point, Figure 1 below gives a comparison among the group of countries, EC (22 countries), BRIC (4 countries) and OECD (26 countries) in terms of GDP growth between the years 2000 and 2014. As can be seen in Figure 1, BRIC Countries has the highest level whereas OECD Countries has the lowest during this period.

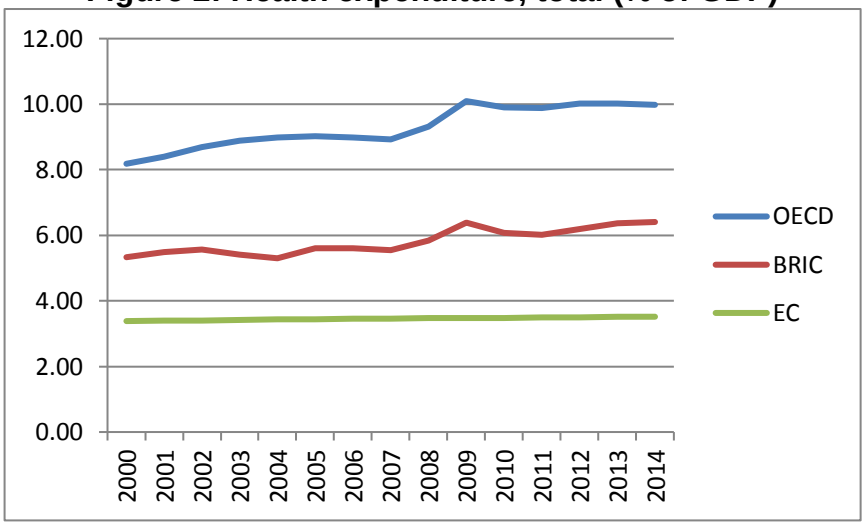
Figure 1: GDP growth (annual %)



Source: *World Bank Development Indicators*

According to World Bank classification based on the GNP (Gross National Product), emerging countries have different income levels such as high, upper and lower middle income groups. Naturally, this situation affects health expenditure of countries'. Figure 2 and Figure 3 give a comparison among the group of countries in terms of health expenditure indicators.

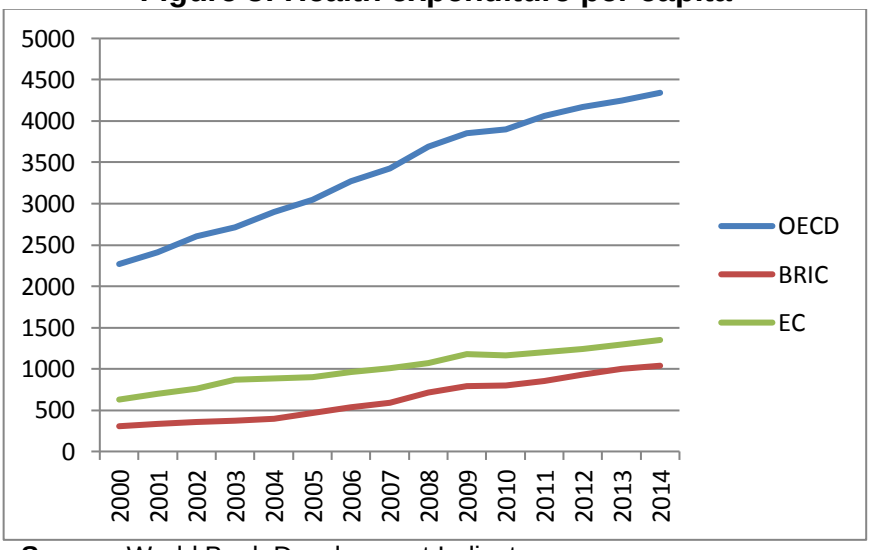
Figure 2: Health expenditure, total (% of GDP)



Source: World Bank Development Indicators

When Figure 2 is examined, it has been seen that health expenditure as a percentage of GDP has increased in OECD and BRIC countries whereas there is no change in emerging countries for the period 2000-2014.

Figure 3: Health expenditure per capita



Source: World Bank Development Indicators

Based on the Figure 3, health expenditure per capita value has remarkable increased in OECD Countries. BRIC Countries and Emerging Countries exhibit almost same pattern in terms of this indicator. It has to be noted that this level is very low for both groups. Also, health expenditure per capita in BRIC countries is lower than that of whole Emerging Countries.

According to another classification, International Money Fund (IMF), countries can be divided into two parts: advanced and emerging and developing countries. In both groups, there have been 37 and 152 countries respectively (IMF 2015). Table 1 presents a comparison for some selected indicators over the decade 2001–2010.

Table 1: Selected Health Indicators

	Advanced Economies	Emerging and Developing Economies
Real public health expenditure (PPT, int. dollars)	1731	221
Public health expenditure in percent of GDP	6	3.2
Private health expenditure in percent of GDP	2.4	2.7
Life expectancy at birth, total (years)	79.1	65.1
Mortality rate, under-5 (per 1,000 live births)	5.2	59.5
Mortality rate, infant (per 1,000 live births)	3.9	38.4
Maternal mortality ratio (per 100,000 live births)	9.1	269.3
TB treatment success rate (in percent of cases)	74.7	77.7
DPT immunization rate (in percent)	94.5	84
Measles immunization rate (in percent)	91.8	83.2
Polio immunization rate (in percent)	94.3	84.3

Source: Francesco Grigoli and Javier Kapsoli (2013)

Based on this table, there are significant differences across economies regarding some health indicators such as real public health expenditure and various mortality rates. This results show that emerging and developing economies need some improvements.

4. The Methodology

The main objective of this study is to assess and to compare emerging countries in terms of health indicators using Multidimensional Scaling (MDS) for the year 2014. Data set, descriptions of variables and method used are explained in the following section.

4.1 Data Set and Variables Used

In this study, list of emerging coutries is taken from MSCI Emerging Markets Index. This index consists of 23 countries, representing 10% of world market capitalization (MSCI, 2016). All variables used in the analysis are obtained from World Bank database (World Bank, 2016). At the beginning of the study, although data set covers 23 emerging countries, analysis is conducted with 22 countries because Taiwan is assumed as part of China in World Bank database. Table 2 presents descriptions of the variables employed in the study.

Table 2: Variables Used in the Analysis

Abbreviation	Descriptions
AFR	Adolescent fertility rate (births per 1,000 women ages 15-19)
LEB	Life expectancy at birth, total (years)
MMR	Maternal mortality ratio (modeled estimate, per 100,000 live births)
MRI	Mortality rate, infant (per 1,000 live births)
MRU5	Mortality rate, under-5 (per 1,000 live births)
IM	Immunization, measles (% of children ages 12-23 months)
IDPT	Immunization, DPT (% of children ages 12-23 months)
TCD	Tuberculosis case detection rate (%, all forms)
IT	Incidence of tuberculosis (per 100,000 people)

Variables selected are the most widely used in the literature and also they are targets of the MDGs at the same time except life expectancy at birth and Immunization for DPT variables. Also, in selecting variables, sustainable development indicators approved by the Commission on Sustainable Development are taken into consideration (UN 2007). Some important variables, however, are excluded in the study due to absence of the data.

4.2 Method Employed

MDS, also known as perceptual (spatial) mapping, is a procedure that enables a researcher to determine the perceived relative image of a set of objects subject or stimuli (Hair et.al., 2006). It is based on proximities between objects, subjects or stimuli used to produce a spatial representation of these items. Proximities can be defined as any set numbers that express the amount of similarity or dissimilarity between data objects. The main purposes of MDS is to construct a map which finds out structural relations or patterns in the data and represent it in a simple geometrical model or picture (Lorcu et al 2012). The map might consist of one, two, three, or even more dimensions. The primary outcome of an MDS analysis is a spatial configuration, in which the objects are represented as points. The points in this spatial representation are arranged in such a way, that their distances correspond to the similarities of the objects which means that similar objects are represented by points that are close to each other, dissimilar objects by points that are far from each other (Wickelmaier 2003). When MDS is performed, first, distance matrix consisting of distances between objects should be constructed. The actual distance between two points *i* and *j* can be computed numerically using the Euclidean distance formula:

$$d_{ij} = \sqrt{\sum_{k=1}^{p}(x_{ik} - x_{jk})^2} \qquad (1)$$

Where d_{ij} is the distance, p is the number of dimensions and x_{ik} is the value of dimension $x_k$for point i and x_{jk} is the value of dimension x_k for point j .

MDS can be performed either metric or nonmetric. In metric MDS, a map constructed in Euclidean space using interval or ratio scale while nonmetric MDS employs ordinal scale. In other words, ranks of the distances are used instead of distances in nonmetric MDS.

MDS does not require strong assumptions that are needed for applying of multivarite statistical techniques. In this regard, MDS differs from factor and cluster analysis in two key aspects: A solution can be obtained for each individual and it does not use a variate (Hair et al 2006).

An MDS solution's fit can be evaluated using various approaches. Kruskal's Stress is the most commonly used measure for evaluating a model's goodness-of-fit. This measure is based on the differences between the actual distances and their predicted values. It is defined by:

$$Stress = \frac{\sum_{i=1}^{n}(d_{ij} - \hat{d}_{ij})^2}{\sum_{i=1}^{n} d_{ij}^2} \qquad (2)$$

Where d_{ij} is actual distance and $\widehat{d_{ij}}$ is predicted distance based on the MDS model. As can be seen from this equation, a small stress value indicates a good fitting solution, whereas a high value indicates a bad fit. Table 3 below provides information for the interpretation of the stress value with respect to the goodness of fit of the solution (Wickelmaier 2003).

Squared correlation index (R^2) is another measure for assessing goodness-of-fit. It is a measure of how well the raw data fit the MDS model. If this index is measured as 0.60 or better, this result is considered as acceptable. In addition, this measure becomes higher, in that case the better solution is obtained (Hair et al 2006).

Table 3: Stress Value and Goodness of Fit

Stress Measure	Goodness-of-fit
>0.20	Poor
0.10	Fair
0.05	Good
0.025	Excellent
0.00	Perfect

Besides, Euclidean distance model, especially for two-dimensional model, and scatterplot of linear fit between distances and disparities can be examined for appropriateness of the model.

5. The Findings

Before conducting MDS analysis, descriptive statistics regarding variables are calculated in the first stage. Table 4 below provides descriptive statistics relating to variables used in MDS analysis.

Table 4: Descriptive Statistics for Variables Employed in Analysis

	Mean	Median	Standart Deviation	Min.	Max.	Range	N
AFR	32.96	28.84	20.88	1.66	67.31	65.65	22
LEB	74.36	74.94	5.56	57.18	82.16	24.98	22
MMR	47.18	26.50	50.62	3.00	181.00	178.00	22
MRI	12.84	10.35	9.87	2.90	39.30	36.40	22
MRU5	14.40	12.00	12.31	3.50	49.80	46.30	22
IM	93.09	95.50	7.71	70.00	90.00	20.00	22
IDPT	92.27	95.00	8.28	70.00	90.00	20.00	22
TCD	75.82	81.00	16.63	32.00	97.00	65.00	22
IT	115.45	38.50	189.16	1.60	834.00	832.00	22

As can be seen from Table 4, especially, standart deviation and range values regarding Infant Mortality rate, Mortality rate for under-5, Maternal Mortality Ratio and Incidence of

Tuberculosis are very high so these variables have more variation than the other variables. In other words, they might greatly change from country to country.

After determining descriptive statistics, correlation matrix is constructed for the variables employed for the year 2014. Based on the results in Table 5 below, there is negative relationship between life expectancy at birth and all mortality rates while there is a positive relationship between that variable and immunization. Also, among the variables, tuberculosis case detection rate is not related with other variables except immunization for DPT.

Table 5: Correlation Matrix for Variables Employed

	AFR	LEB	MMR	MRI	MRU5	IM	IDPT	TCD	IT
AFR	1	-0.426*	0.431*	0.488*	0.468*	-0.408	-0.614*	-0.326	0.284
LEB		1	-0.786**	-0.847**	-0.836**	0.814**	0.791*	0.359	-0.834**
MMR			1	0.930**	0.938**	-0.867**	-0.881**	-0.297	0.706**
MRI				1	0.999**	-0.835**	-0.836**	-0.337	0.684**
MRU5					1	-0.831**	-0.833**	-0.319	0.674**
IM						1	0.925**	0.428*	-0.858**
IDPT							1	0.337	-0.811**
TCD								1	-0.303
IT									1

*Legend *p<0.05 **p<0.01*

Morover, the relationship between GDP growth and health expenditure as a percentage of GDP is analyzed using correlation analysis for the year 2014 and correlation coefficient is obtained as -0.644. Accordingly, there is negative relationship between two variables in 2014. However, when the same relationship is examined between the years 2000-2014, it has been seen that there is no relationship between GDP growth and health expenditure as a percentage of GDP. In addition, it has been noticed that there is no relationship between GDP growth, health expenditure as a percentage of GDP and other health indicators in these countries.

To assess countries in terms of health indicators, MDS analysis is conducted for the two and three dimensional solution respectively. When the Stress Measure and R^2 values are examined, it has been seen that three dimensional solution has lower stress measure and higher R^2 value. So this solution is better than two dimensional solution. Table 6 gives the Stress Measures and R^2 values for both solutions. In addition, Euclidean distance model and scatterplot of linear fit between distances and disparities are presented for three dimensional solution in Appendix part of this study.

Table 6: Stress Measure and R^2 Values

Number of Dimensions	Stress Measure	R^2
k=2	0.09546	0.97487
k=3	0.04685	0.99323

After determining the number of dimensions in the MDS model, coordinates of the countries on the dimensions are examined. Table 7 states coordinates obtained from three dimensional solution. According to this, in Dimension 1, South Africa, India, Indonesia, Philippines are similar countries and these countries are the most important discriminators while Czech

Republic, Greece, Hungary, Korea, Poland and Qatar are dissimilar to other countries. In Dimension 2, India is the most distant country. In Dimension 3, there is no similar or dissimilar country.

Moreover, again, disparities matrix obtained from three dimensional solution is examined, South Africa is idendified as the most dissimilar to other countries. Similarly, India, Indonesia and South Africa are dissimilar countries. On the other hand, Greece, Hungary, Poland, Czech Republic, Korea and Qatar are very similar countries as a group. In additon to this, Brazil, Colombia, Peru and Mexico are similar countries as another group.

Table 7: Coordinates of the Countries for Three Dimensional Solution

Countries	Abbreviation	Dimension 1	Dimension 2	Dimension 3
Brazil	VAR1	-0.0086	0.4278	0.8407
Chile	VAR2	-0.7683	0.3091	0.5878
China	VAR3	-0.9451	-0.5642	-0.1758
Colombia	VAR4	0.2824	0.2083	0.3331
Czech Republic	VAR5	-1.5781	-0.4928	-0.0090
Egypt, Arab Rep.	VAR6	0.5550	0.9324	0.1866
Greece	VAR7	-1.5923	-0.4197	-0.1057
Hungary	VAR8	-1.0520	0.2254	-0.3878
India	VAR9	**2.7651**	**-1.1925**	0.7147
Indonesia	VAR10	**2.6816**	0.9022	-0.7249
Korea, Rep.	VAR11	-1.6565	-0.6099	-0.2779
Malaysia	VAR12	-0.6466	-0.2507	-0.4174
Mexico	VAR13	-0.1154	0.5176	0.8127
Peru	VAR14	0.4435	0.0152	0.2821
Philippines	VAR15	**1.8216**	-0.2079	0.6782
Poland	VAR16	-1.2796	-0.1246	-0.2258
Qatar	VAR17	-1.1717	-0.0452	-0.3249
Russian Federation	VAR18	-0.5964	-0.3661	-0.1968
South Africa	VAR19	**4.4013**	-0.7115	-0.7987
Thailand	VAR20	-0.3375	0.7431	-0.3011
Turkey	VAR21	-0.5823	-0.3806	0.2442
United Arab Emirates	VAR22	-0.6201	1.0847	-0.7343

6. Summary and Conclusions

Sustainable development is an integrative concept which consists of social, economic and environmental dimensions. As social dimension considers to improve quality of human life and the human wellbeing, health is one of the most significant part of this dimension in sustainable development. On the other hand, emerging countries are fast-growing economies and their growth affects whole world economy. Accordingly, the aim of this study is to assess and to compare emerging countries in terms of health indicators using MDS. Some important variables, however, are excluded in this study due to missing data. Besides, it should be noticed that results reflect health status of countries' for the year 2014 since MDS analysis has examined only one year. In this regard, findings should be carefully discussed.

First, various group of countries has been compared using graphs. When some indicators such as GDP growth, total health expenditure as a percentage of GDP and health expenditure per capita are examined during 2004-2014 period, it has been seen that although emerging countries have higher growth rate than that of OECD countries, Health expenditure as a percentage of GDP ratio is, also, under the OECD level. Moreover, it has been found that there is negative relationship between GDP growth and total health expenditure as a percentage of GDP ratio in emerging countries for the year 2014. This situation shows that total health expenditure does not move together with GDP growth in these countries. This result supports findings obtained from previous studies. Unlike other studies, however, all health indicators are not associated with GDP growth and health expenditure as a percentage of GDP in emerging countries. This fact can be explained with difference in their income level of these countries.

Second, in view of the MDS results, South Africa is identified as the most dissimilar to other countries. Similarly, India, Indonesia and South Africa are dissimilar countries on the other hand, Greece, Hungary, Poland, Czech Republic, Korea, Qatar are very similar countries as a group. Besides, it has been found that Brazil, Colombia, Peru, Mexico are similar countries as another group. In the first group, India and Indonesia have lower middle income level while South Africa has upper middle income level. In the second group, all of them have high income level. In addition, four of them are both OECD and European Union member countries. In the last group, all of them have upper middle income level. It should be noted that countries that are very close each other geographically are gathered in each group. In fact, these results are not unforeseen event. Since these countries have shared almost similar economic conditions and income levels, they might have similar health indicators.

Even though GDP growth is not related to health indicators of emerging countries in 2014, when similar and dissimilar countries are examined, the overall findings show that income level can be regarded as very important factor for view of health status of the countries'. In fact, emerging countries have different income levels, demographic factors, health systems and this situation has been affecting health indicators.

From a policy perspective, emerging countries have a high economic potential and they have been becoming important players in the world economy. Although they are fast-growing economies, they need to be fulfilled some improvements in health area. Hence, it should be noticed that most of emerging countries are not among the most prosperous countries according to income level. Therefore, they should attach importance of health-related issues and provide more financial support to the society.

Endnotes

[1]The "country" term is used instead of "economy" because countries are employed as analysis unit throughout the study.
[2] As of July 2016, Latvia has become a full member of the Organisation. In calculations, 34 member countries have been taken into consideration.

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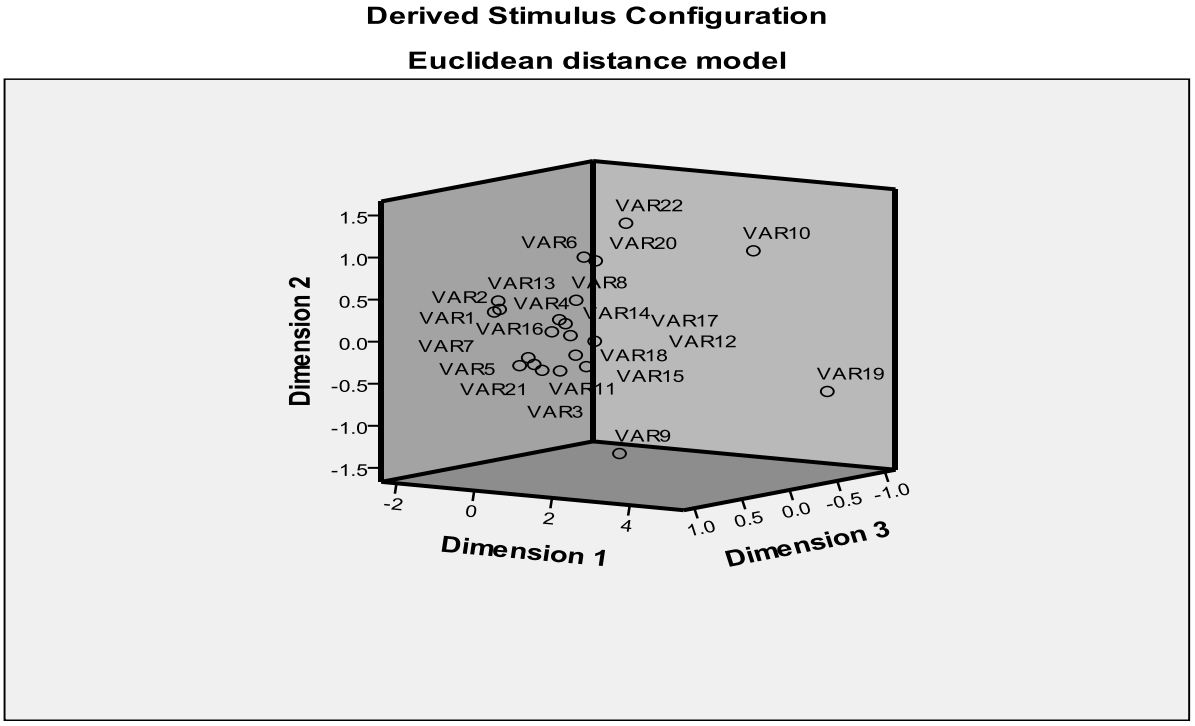
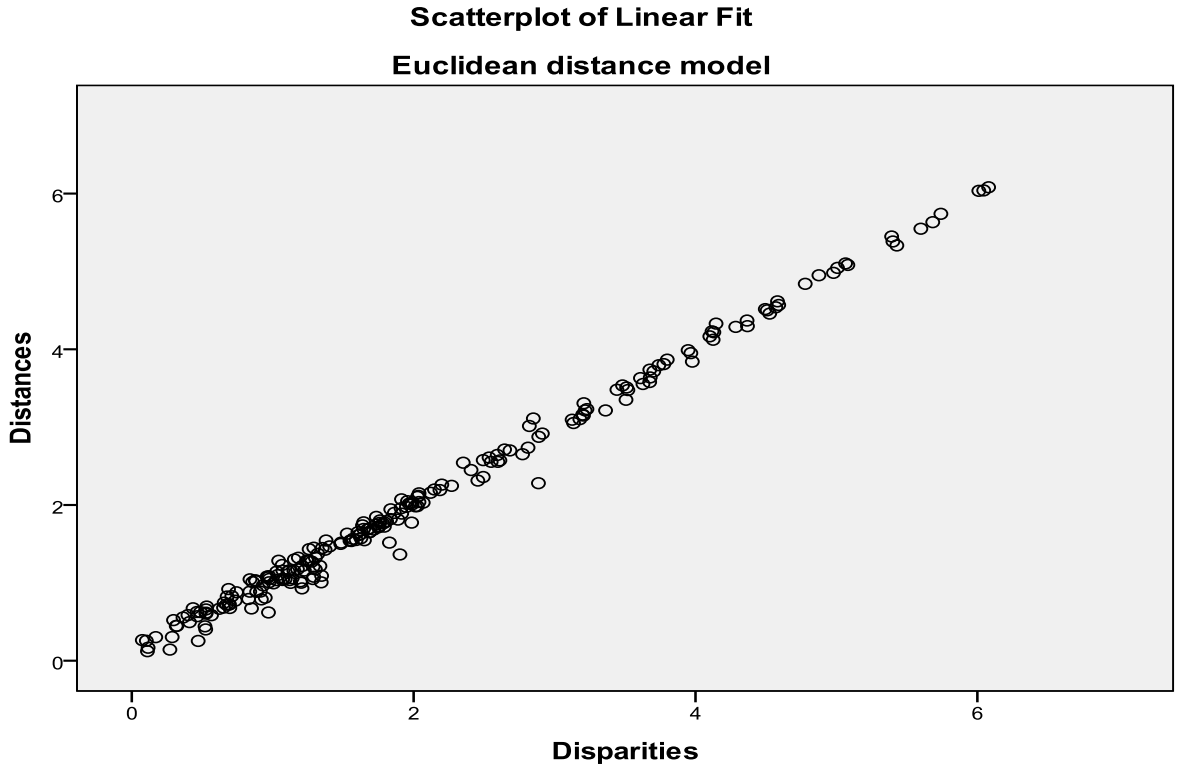
Appendices

Appendix 1: Euclidean distance model and scatterplot of linear fit between distances and disparities





Appendix 2: Disparities Matrix for Three Dimensional Solution

	1	2	3	4	5	6	7	8	9	10
1	.000									
2	.947	.000								
3	1.691	1.303	.000							
4	.487	.974	1.558	.000						
5	1.989	1.240	.527	1.968	.000					
6	1.127	1.828	2.039	.919	2.612	.000				
7	2.068	1.154	.621	1.983	.111	2.598	.000			
8	1.622	1.196	.677	1.486	.932	1.735	.912	.000		
9	3.362	3.977	3.799	2.887	4.526	2.849	4.509	4.130	.000	
10	3.205	3.676	3.967	2.645	4.570	2.455	4.495	3.775	2.352	.000
11	2.270	1.379	.689	2.187	.287	2.812	.075	1.069	4.590	4.582
12	1.570	1.150	.409	1.247	.839	1.808	.857	.463	3.704	3.482
13	.270	.671	1.716	.532	1.910	1.344	1.949	1.592	3.507	3.217
14	.710	1.042	1.626	.103	2.027	1.208	2.034	1.688	2.773	2.535
15	1.838	2.593	2.913	1.528	3.442	1.986	3.511	3.124	1.903	2.026
16	1.733	1.071	.363	1.645	.296	2.120	.315	.320	4.285	4.125
17	1.750	1.138	.398	1.613	.651	1.956	.527	.170	4.117	3.948
18	1.258	1.285	.525	1.176	.974	1.645	1.202	.734	3.675	3.627
19	4.779	5.392	5.401	4.366	6.010	4.369	6.045	5.599	2.886	2.494
20	1.067	1.291	1.352	1.121	1.793	1.026	1.792	.837	3.740	3.135
21	1.072	.828	.566	.975	.877	1.637	.965	1.006	3.520	3.679
22	1.889	1.548	1.759	1.604	2.011	1.483	1.863	.880	4.146	3.208

	11	12	13	14	15	16	17	18	19	20
11	.000									
12	.960	.000								
13	2.148	1.557	.000							
14	2.200	1.303	.687	.000						
15	3.609	2.683	1.914	1.291	.000					
16	.527	.435	1.673	1.762	3.230	.000				
17	.656	.465	1.688	1.752	3.199	.116	.000			
18	1.347	.471	1.372	1.287	2.494	.693	.849	.000		
19	6.080	5.081	4.876	4.102	2.821	5.741	5.683	5.007	.000	
20	1.915	1.088	1.225	1.335	2.550	1.259	1.108	1.028	4.979	.000
21	1.209	.696	1.120	1.037	2.407	.743	.886	.519	5.065	1.276
22	2.038	1.321	1.754	1.835	3.179	1.404	1.182	1.651	5.429	.970

	21	22
21	.000	
22	1.782	.000