Classifying OECD Countries According to Health Indicators Using Fuzzy Clustering Analysis

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Extensive Summary

1. Introduction

Determining development and especially socio-economic development level of countries, health care used as an important measure as well as economic, social and cultural factors (Temür ve Bakırcı, 2008: 262). One of the development indicators - health care and health servives which aims to improve and to protect the health is an important for all countries.

Health policies composed by economic, political and cultural situation of each countries aims to improve the life expectancy at birth, to reduce infant mortality rate, to provide quality health services including modern technology, sufficient capacity and ability and to create a healthy society (Kocaman vd., 2012: 15). The quality of health services is very important in terms of social and economic dynamism of the all countries. (Mollahaliloğlu vd., 2011: 1).

2. Methodology

This study was conducted in order to classify OECD countries according to health indicators using fuzzy clustering analysis, to identify the cluster in which Turkey is in and the other countries located in the same cluster with Turkey and to determine whether Turkey shows similar characteristics with other countries located in the same cluster or not.

The number of physicians, number of hospital beds, health expenditure per capita, life expectancy at birth and maternal mortality are variables that directly affect the health; percentage of daily smoking adults over the age of 15, fruit consumption, the percentage of children with measles vaccine, carbon monoxide (CO) emissions and the expected enrollment between the ages of 5-39 are environmental variables that indirectly affect the health used in the study.

The study was conducted with 34 OECD countries which include Turkey. A large proportion of data related to the variables used in the research were obtained by OECD

database statistics (http://stats.oecd.org/) where a large number of data and metadata located. Only data of "number of physicians per 1,000 people" variable is taken to the World Bank's website (http://data.worldbank.org/indicator). In the fuzzy clustering analysis, NCSS 10 package is used. Fuzzy clustering analysis in the study is performed according to the method of fuzzy c-means cluster analysis.

3. Findings and Discussions

Between the OECD countries, Turkey's has the highest probability value in the fourth cluster. So, Turkey is one of the country located in the fourth cluster. In fuzzy clustering analysis, to determine the appropriate number of clusters $\overline{SC}$ values (average silhouette statistics) are expected to be at least 0.50; $F_k(U)$ (normalized Dunn's partition coefficient) is expected to be high and $D_k(U)$ (normalized Kaufmann partition coefficient) is expected to be low. So; the most appropriate cluster number is five. According to the results, Turkey is located in fourth cluster. Other countries located in this cluster with Turkey are Estonia, Hungary, Mexico, Poland Chile.

There are some common characteristics of countries located in fourth cluster. Countries except Turkey were participated OECD later. Turkey is a founding country but Mexico was became a member of OECD in 1994, Hungary and Polond was became a member of OECD in 1996, Chile ve Estonia was became a member of OECD in 2010. These countries are first six countries with the lowest health expenditure per capita. Also, six of the first eight countries which have the lowest value of life expectancy at birth is located in this cluster. Within the all countries, Mexico has the lowest value of expected enrollment between the ages of 5-39. Also it is seen that maternal mortality rate is high in these countries.

In this study, it is aimed to determine Turkey's situation along countries located in fourth cluster. To this end, data of Turkey and other five countries in the same cluster is compared. According to this, Turkey is the second country which has the least number of physicians, third country which has the least number of hospital beds, first country which has the least health expenditure per capita, second country which has the least daily smoking adults over the age of 15. Also, it is the third country according to measles vaccine of children, second country that has a lowest value with CO emissions, expected enrollment between the ages of 5-39 and life expectancy at birth. Turkey is the first country with the most fruit consumption and fourth country with the most maternal mortality rate.

Although Turkey shows a moderate level of efficiency in terms of some variables; in particular, it is considered to necessary to increase the number of physicians, health expenditure per capita and expected enrollment between the ages of 5-39 to have access better health status. It is believed that ensure economic stability and public education and awareness needs to be raised. This study aims to compare between OECD countries with health indicators, to assess the current situation of Turkey and other countries located in the same cluster. Therefore, this study asked to be guiding health managers, planners, policy makers, decision-makers and academicians interested in this subject.