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Financial analyses of ODHCs in Turkey in terms of profitability

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Kewords
Inverse Distance Weighting
Financial Performance Analysis
Oral and Dental Health Center

ABSTRACT

Oral and Dental Health Centers (ODHC), which occupy an important place in health services, have increased in number with the Health Transformation Program (HTP) implemented in Turkey (Islıcık & Yar, 2018). In this way, public access to dental treatment services has been facilitated and have allowed them to gain continuity. These services, which allow people to increase their well-being , contribute to the mental well-being of individuals, but also come to the fore in their therapeutic aspect. Services, whose contribution is undeniable in terms of social benefit, require quite high amounts of resources from the point of view of the country's economy. This also requires a financial performance analysis.

Dentists are one of the most important factors for ODHCs to continue their work regularly. For this reason, in the study, financial performance analyzes of existing ODHCs depending on the variable of profit per dentist were carried out with Geographical Information Systems (GIS) Inverse Distance Weighting-IDW and related maps were produced. When the GIS findings are evaluated, a more understandable result is obtained by visualizing the financial performance analysis of 128 public ODHCs, and the importance levels of the variables that affect the performance are also revealed.

1. INTRODUCTION

There are many service areas that people need to live their lives. Health services are also one of these areas that are needed because of their vital importance on human life.

Financial performance analysis is one of the most challenging areas for health systems and is of critical importance. A performance analysis gives businesses the opportunity to test the efficiency of their past activities. In order to ensure efficiency and productivity in the use of resources, minimizing expenses and maximizing revenues, financial performance analyzes are also closely related to politicians and decision makers. A performance analysis allows you to act consciously in decisions, work and actions to be taken (Ercan , Dayı, & Akdemir, 2013). For this reason, it is recommended that performance analysis be performed regularly for ODHCs.

In this study, data of 128 ODHCs were obtained from the Department of Statistics, Analysis, Reporting and Strategic Management of the Ministry of Health, based on the first 6 months of 2016. From the data obtained, the number of canal treatments per dentist, the number of fillings per dentist, the number of teeth extracted per dentist scaling per dentist, the number of surgical interventions per dentist and fixed prosthesis per dentist and the number of removable prostheses per dentist were the variables used in financial performance analysis as factors affecting profit per dentist. As a result of the interpolation studies carried out in the GIS which allows analysis of all these factors on a spatial basis, maps showing the financial status of the existing ODHCs were created. This study is important in terms of benefiting from GIS while performing financial performance analysis of ODHCs.

2. METHOD

In this study, the performance analysis of ODHCs and the spatial distributions according to several factors which are effective on the current performances of ODHCs are revealed, and the performance improvement of ODHCs have been determined by IDW. Inverse distance weight interpolation method is based on the use of inverse weighting of the distance between points

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whose main values are known and the point to be estimated as weight (Göğsu & Hastaoğlu, 2019). Rather than point representation, the IDW technique was used because it enables the raster representation to compare this value of the factor at the points whose value is known visually much more effectively with the values of the other values of the points. In accordance with this selection, the distributions resulting from the application of the inverse distance weight interpolation method (Inverse Distance Weighting-IDW) technique were used for raster notation.

As a result of the analysis carried out in ArcGIS using the IDW method, the mathematical model of which is given below, colored maps can be created that effectively show the spatial distribution of the financial performance of the Centers. Since the weighted moving average is a widely used approach in interpolation, IDW is a preferred form in GIS analysis, although various methods including different weight functions have been used. IDW is a complete intermediate generator (interpolator) and reinforces the values of the data. The IDW estimator can be given by the following equation (Demircan, Alan, & Şensoy, 2011)

$$Z(X_0) = \frac{\sum_{1=1}^{n} z(X_i).d_{i0}^{-r}}{\sum_{i=1}^{n} d_{i0}^{-r}} \qquad (1)$$

The location X_0, where the predictions are made is a function of n neighboring measurements giving the number of neighboring measurements. ($z(X_i)$ ve i=1,2,…,n,); r is the exponential value that determines the assigned weight of each of the observations, and d_{i0} is the distance that separates the observation location X_i and the prediction location X_0. As the exponent grows, the assigned weight of observations far from the prediction location shrinks; increasing the denominator indicates that the forecasts are very similar to the nearest observations (Demircan, Alan, & Şensoy, 2011).

3. RESULTS

In the study, the financial performance analysis of the centers was carried out based on the variable profit per dentist obtained by the inclusion of income and expense items of 128 public ODHCs into the process. The IDW interpolation method was used to reveal spatial patterns of the resulting variance in the financial performance of the Centers, and maps were created that effectively revealed spatial models of the financial performance of the CentersIn this way, the pattern of financial performance of existing ODHCs in terms of profitability per dentist in the country was demonstrated by measuring. Profitability per dentist financial performance of centers visualized by interpolating them with GIS.

The variable of profit per dentist was obtained as a result of mathematical processing of the numbers of scaling treatment, root canal treatment, surgical intervention treatment, fixed prosthesis treatment, extraction and filling treatment. The variables that had the most effect on the profit variable were determined. After that the variables with the highest impact rate and the profitability variable were analyzed together and maps were created to determine the current situation. When the maps created are examined, the subsets that affect profitability and their effects on performance measurement are seen. When Scaling treatment is analyzed together with Surgical treatment, the profitability map of Turkey is formed given in Figure 1.

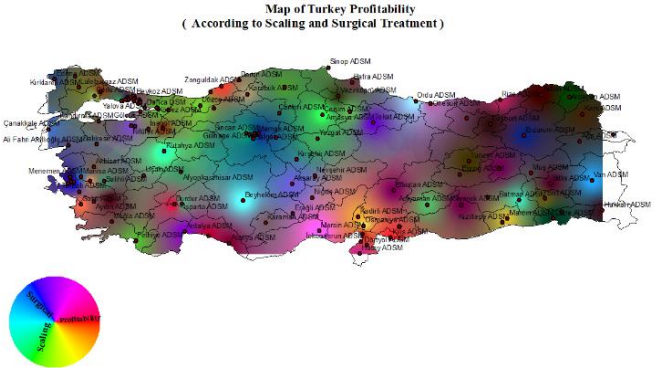

Figure 1. According to Scaling and Surgical Treatment

When Scaling treatment is analyzed together with Root Canal Treatment, the profitability map of Turkey is formed given in Figure 2.

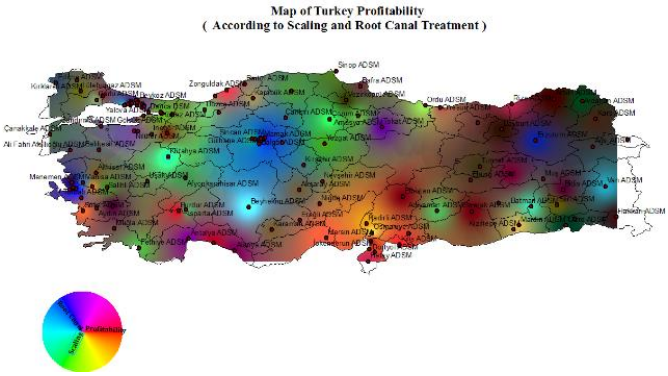

Figure 2. According to Scaling and Root Canal Treatment

When Scaling treatment is analyzed together with Fixed Prosthesis treatment, the profitability map of Turkey is formed given in Figure 3.

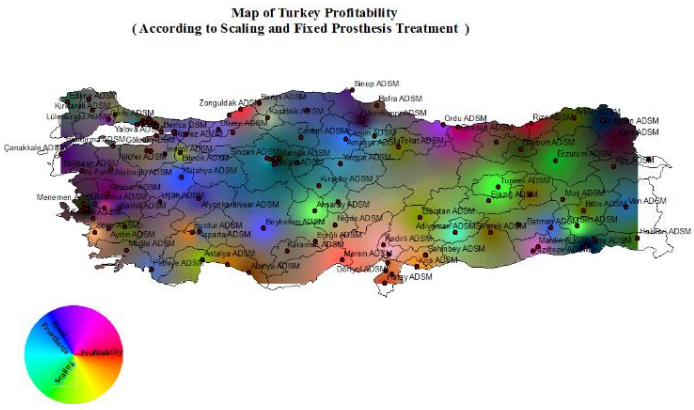

Figure 3. According to Scaling and Fixed Prosthesis Treatment

When Root Canal treatment is analyzed together with Surgical treatment, the profitability map of Turkey is formed given in Figure 4

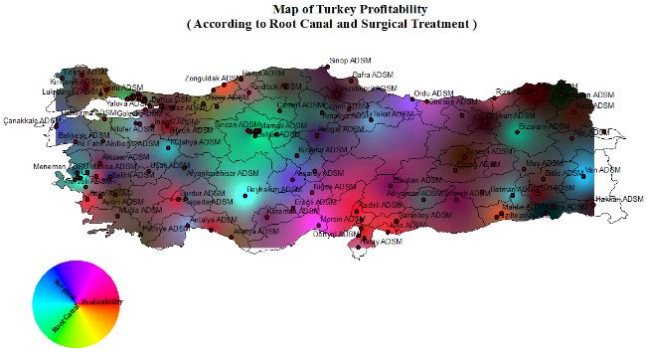

Figure 4. According to Root Canal and Surgical Treatment

When Root Canal treatment is analyzed together with Fixed Prosthesis treatment, the profitability map of Turkey is formed given in Figure 5.

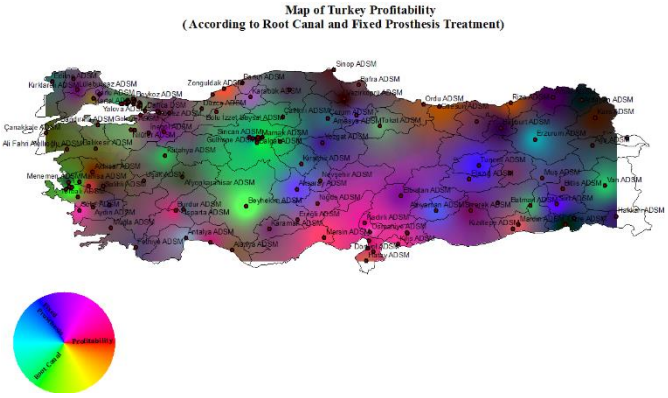

Figure 5. According to Root Canal and Fixed Prosthesis Treatment

4. CONCLUSION

Today, it is important for healthcare enterprises to evaluate their performance in order to increase their competitiveness and ensure their continuity (Samut 2014). Since areas that need to be improved can be easily identified in performance analysis, regular performance analysis is a report card for institutions. Performance analysis of ODHCs, which facilitate public access to treatment in the health sector, is important.

In this study, the financial performance assessment of 128 ODHCs in Turkey was carried out in GIS. Performance evaluation is based on the variable profit per dentist. The variables affecting profitability per dentist more; number of scaling treatments, surgical intervention treatment, root canal treatment and fixed prosthesis treatment.In addition to the profit variable per dentist, other variables with a high impact rate were taken into account during the analysis. As a result of the analysis, maps were created where the contribution of these variables on profitability can be seen.

As a result of the financial performance assessment of the centers, it is seen that there are profit centers, as well as losses. When the analyzes are evaluated, the center that has the best performance Tunceli Oral and Dental Health Center. The reason for the high performance of this center is that it is the only ODHC on a provincial basis, there isn't other public dental treatment center that the public can apply to and the socio-economic situation of the public According to the analysis results, the financial performance of 26 ODHCs is high. These centers are clustered in two points. These are Central Anatolia region and Aegean region. The reasons for the high financial performance in these regions are the intensive application of the treatments that affect the profit rate the most, the population density receiving service from the centers and the number of other ODHCs accessible in that region.In addition, the educational level of the people living in this region, the economic situation, the quality and competence of the dentists who carry out their activities in the private sector can be interpreted as other factors that affect the financial performance of the centers.

On the other hand, when the financial performance is evaluated, it is seen that 14 centers have lost. When these centers are examined, the centers with lowest financial performans among the ODHCs is found as Şırnak Dt. Nurullah Kadirhan. Cizre ODHC, located in the Cizre district of Şırnak, is recorded as the second most unprofitable center. It is possible to say that the reasons for the loss of the centers in Şırnak province are high expenditure and the socio-economic and socio-cultural situation in the region.

When the resulting clusters are evaluated, finding low-performance centers in high-performance clusters can be considered as a remarkable finding in terms of the study. It is possible to interpret that there is not competitive relationship between centers, after examining the spatial patterns that explain financial performance. The fact that the centers are financed by the state is considered to be effective in this situation.

In this study, the financial performance of ODHCs was measured and the importance of variables affecting performance was revealed. As a result of the literature review, there are only few studies on financial performans analyses on ODHC. It shows that a financial performance analysis for ODHCs that require high amounts of resource use will provide important information that can be used by individuals, institutions and organizations.

Potential population information from the centers was not taken into consideration in the study. How the financial performance changes by keeping the population information served from the centers under control is also a new research topic. Furthermore, in order to develop a holistic understanding of the financial performance of the centers, it can also be investigated how variance changes over the years. Thus, more valid findings can be obtained with the financial performance of the health system.

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