



**MARMARA UNIVERSITY
INSTITUTE FOR GRADUATE STUDIES
IN PURE AND APPLIED SCIENCES**



ASSESSING THE QUALITY OF CARE IN TURKISH HOSPITALS: A DEA APPROACH

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Ph.D. THESIS

Department of Industrial Engineering

Thesis Supervisor

Prof. Dr. Nurhan DAVUTYAN

ISTANBUL, 2022



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Claim for Originality

I hereby certify that this dissertation represents my independent and original work. I have properly cited all sources to the best of my ability.

Part of the work included in this dissertation has been presented in peer-reviewed journals¹² and academic conferences³. Other than that, work contained in this dissertation is free from plagiarism and has not been submitted for any other degree or purpose.

Murat Bilsel

¹Bilsel M. & Davutyan N. (2014) Hospital efficiency with risk adjusted mortality as undesirable output: the Turkish case. *Ann Oper Res* 221:73–88

² Davutyan, N., Bilsel, M., & Tarcın, M. (2014). Migration, risk-adjusted mortality, varieties of congestion and patient satisfaction in Turkish provincial general hospitals. *The Data Envelopment Analysis Journal*, 1(2), 135–169

³ Bilsel, M. and Davutyan, N, “Hospital Efficiency with Endogenously Determined Direction Vectors,” 13th International Conference On Data Envelopment Analysis, Braunschweig, Germany, Aug. 24-28, 2015

ÖZET

TÜRK HASTANELERİNDE HİZMET KALİTESİNİN İNCELENMESİ: VZA YAKLAŞIMI

Son yıllardaki ilerlemelere rağmen Türk sağlık sisteminin çıktıları gelişmiş ülkelerin gerisinde kalmaktadır. Kaynak kıtlığının sağlık hizmetlerine artan talep ile birleşerek sağlık sistemi üzerindeki yükü arttırması olasıdır. Dolayısıyla, kısıtlı kaynakların en iyi şekilde kullanımı için hizmet sağlayıcılarının doğru değerlendirilmesi elzemdir.

Sağlık hizmetlerinin verimliliği ölçülürken, hizmet kalitesi çıktı seviyesi kadar önemlidir. Ancak literatürdeki çalışmalarının çoğu bunu görmezden gelmekte ve tamamen çıktı artırımına veya girdi azaltmasına odaklanmaktadır. Bu çalışmanın amacı veri zarflama analizinin yönsel mesafe yöntemini kullanarak hastanelerin verimlilik seviyelerini hizmet kalitesine vurgu yaparak ölçmektir.

Önerilen modelde 6 girdi, 14 (iyi) çıktı ve 1 istenmeyen çıktı mevcuttur. Veri seti, Sağlık Bakanlığı'na bağlı 330 hastaneden oluşmaktadır. Yatan hasta başına ölüm oranının istenmeyen çıktı olarak kullanılması hizmet kalitesinin modellenmesine olanak vermektedir. Hastanelerin verimlilik seviyeleri, farklı üretim olanakları eğrileri kullanılarak hesaplanmış; bu da verimsizliklerin teknik, ölçek ve tıkanıklık bileşenlerine ayrılmasını mümkün kılmıştır. Hizmet kalitesini etkileyen faktörleri tespit etmek amacı ile verimlilik seviyeleri Sağlık Bakanlığının yaptığı yatan hasta memnuniyet anketi sonuçları ile analiz edilmiştir. Ayrıca, tıkanıklığın sebeplerinin bulunması için göç istatistikleri ile de karşılaştırılmıştır.

Sağlık Bakanlığı, hastaneleri tek tek değil, hepsinden oluşan hastane sistemini idare etmektedir, dolayısıyla tüm sisteme yönelik tavsiyelerde bulunulması önemlidir. Üretim olanakları eğrisine giden en kısa yolu kullanan endojen belirlenen yönsel vektörler hesaplanmıştır. Bu sonuçların toplanması ile hastane sisteminin tümüne yönelik politika tavsiyesi olması önerilmiştir.

ABSTRACT

ASSESSING THE QUALITY OF CARE IN TURKISH HOSPITALS: A DEA APPROACH

Despite much progress in the last years, outcomes of the Turkish Healthcare system lags behind developed countries. Lack of resources, coupled with increasing demand for healthcare services is likely to increase the burden on the healthcare system. In order to facilitate best use of limited resources, accurate assessment of providers is essential.

When measuring healthcare efficiency, quality of care is as important as level of output. However, most work in the literature disregards this and focuses solely on output expansion or input reduction. This study aims to present application directional distance approach of data envelopment analysis measure efficiency levels of hospitals with an emphasis on quality of care.

Proposed model has 6 inputs, 14 (good) outputs and 1 undesirable output. There are 330 hospitals, all operated by the Ministry of Health, in the dataset. Inclusion of death to inpatient ratio as an undesirable output allows modeling of quality of care. Efficiency levels of hospitals are calculated using different production possibility frontiers, allowing inefficiency levels to be decomposed into technical, scale and congestion inefficiencies.

With the aim of determining the factors effecting quality of care, results of efficiency calculations were analyzed with inpatient satisfaction survey scores conducted by the Ministry of Health. Moreover, they were compared with migration statistics to determine the causes of congestion.

Ministry of Health manages not only individual hospitals, but the hospital system, therefore providing guidelines to the entire system is essential. Endogenously determined direction vectors that are optimized for the shortest distance to the efficient frontier are calculated. Aggregation of these results is proposed as policy of the hospital system.

SYMBOLS

DLP_0 : Dual Linear Program

X : Inputs

Y : Outputs

λ : Weights

$P(x)$: Output set

β : Scaling variable

g : Direction vector

S : VRS-Strong projection to the efficient frontier

W : VRS-Weak projection to the efficient frontier

ABBREVIATIONS

ALSCAL : Alternating least-squares algorithm

BCC : Banker, Charnes and Cooper

CCR : Charnes, Cooper and Rhodes

CRS : Constant Returns to Scale

DDF : Directional distance function

DEA : Data Envelopment Analysis

DMU : Decision Making Unit

HTP : Health Transformation Program

ICU : Intensive Care Unit

MoH : Ministry of Health

PCA : Principal Component Analysis

PPP : Purchasing Power Parity

PPS : Production Possibilities Set

SBM : Slacks-based measure

SFA : Stochastic Frontier Analysis

VRS : Variable Returns to Scale

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1. INTRODUCTION

Article 56 of the Turkish Constitution defines living in a healthy and balanced environment as a social right for all. Moreover, it obliges the government to plan and regulate health institutions to ensure everyone can live in physical and mental health. [1]

Under-resourced healthcare system is one of the most persistent problems of Turkey. As of 2018, it ranks last among 35 OECD countries for health expenditure as share of GDP (4.2%) [2], number of doctors per population (1.9 per 1000) [3, 2] and number of nurses per population (2.1 per 1000) [4]. Despite the lack of resources, life expectancy at birth is 78.1 years [5] which is above average for an upper middle-income country [6, 7].

Turkey is currently experiencing a demographic transition; between the years of 2008 and 2018 median age has increased from 28.5 years to 32, while share of people 65 or older increased from 6.84% to 8.76% [7]. In the meantime, current health expenditure as share of the GDP decreased from 5.3% to 4.2% [8]. Ageing population coupled with lack of resources is likely to increase the stress on the already strained health care system.

Shortage of resources and increased demand to health services due to aging population make pursuit of efficiency in Turkish Healthcare system even more important than ever. First step in reaching efficiency should be finding inefficiencies in the system. This study aims to determine inefficiencies in the Turkish Healthcare system using Data Envelopment Analysis (DEA).

Unlike most productivity or efficiency research, cost containment or output maximization is not the sole aim of health care management, because quality of care is as important as the amount of care provided. In this study, quality is modeled using number of deaths which is considered an undesirable output. Efficiency is obtained by increasing (desired) outputs while reducing inputs and undesirable outputs.

Main method used in this study is the directional distance method first used by Chung et al. [9]. This method was originally developed to deal with environmental impact of pulp and

paper industry. In addition to allowing modeling undesirable outputs, another advantage of directional distance method is enabling input reduction and output expansion simultaneously. Moreover, this analysis can be done under the assumptions of strong disposability and weak disposability. Performing both and comparing them allows the determination of amount of congestion in the hospitals [10].

This dissertation will be organized as follows: Chapter two will present an overview of the Turkish Hospital System and summary statistics of the data that will be used in this study. Chapter three will survey of the current literature and present methodology that will be used. Results will be presented and discussed on chapter four. The fifth and final chapter will summarize the findings and discuss future research possibilities.

2. TURKISH HEALTHCARE SYSTEM

A healthcare system or health system can be defined as the set of all actions, institutions, and resources whose primary goal is to improve health. This not only includes personal curative and preventive services managed by the Ministry of Health (MoH) but also non-personal health services like water and sanitation as well as intersectoral actions like enforcement of motorcycle helmet use [11].

2.1. Classification of Turkish Healthcare System

Healthcare systems can be classified into one of three categories, from the most government control to least they are: National health service, social insurance and private insurance. In the national service model, the government controls and pays for the healthcare services. Because of complete government control and universal coverage, everyone has the same access to healthcare services and this type of system has the advantage of social equity. The United Kingdom and Sweden are examples of this model. In the social insurance model, coverage is part of the social security system and healthcare is financed by employee and employer contributions (as opposed to taxes) while provision of the services can be done by public and/or private institutions. Germany and Japan can be classified into this system. On the other end of the spectrum, we have private insurance model where most of the services are provided by private institutions and paid by the patients or private insurance firms. The United States and Singapore have such healthcare systems. [12]

Wendt et al. [13] proposed a framework to classify healthcare systems on three dimensions: Financing, service provision and regulation. Each of these dimensions can be performed by the state, non-governmental actors, or private individuals. Thus, total number of possible combinations 27. However, some of these combinations, e.g. private regulation along with public financing and provision, are very unlikely. In fact, it was shown that only 5 of the 27 potential types are encountered within the OECD. These are: National Health Service (dominated by state), National Health Insurance (State regulated and financed, private provision), Social Health Insurance (non-governmental regulation and finance, private delivery), Private Health System (market dominated), Etatist Social Health Insurance

(regulated by state, financed by non-profit insurance and private provision) and a social based mixed type⁴ Moreover, in almost all countries all three actors are present on all three dimensions [14].

Using clustering analysis to compare with other OECD countries, Turkish Healthcare System can be characterized by low total healthcare expenditure, low share of public financing, and little government regulation on access. Israel is the country with the most similar system. [15]

2.2. Performance of Turkish Healthcare System

An healthcare system can be assessed on equity [16], effectiveness [17] and efficiency [18]. The next two chapters of this study is concerned with efficiency. However, before moving on to efficiency, it is important to examine the equity and effectiveness of the healthcare system as well.

2.2.1. Accessibility of Turkish Healthcare System

In a perfect world, everyone would have access to all healthcare services they need, but in reality, access to healthcare is inhibited by financial reasons, lack of resources and long waiting or traveling times [19].

Inequality arises when different socioeconomic groups have different levels of access to healthcare. Inequality can be measured using indicators of health status such as life expectancy, mortality rate, infant mortality, self reported health level and disability; or using indicators of access, for example health insurance coverage, out-of-pocket expenditure, healthcare utilization and unmet care needs [20].

While accessibility has improved since the implementation of the Health Transformation Program (HTP), lower levels of education and income is associated with higher levels of unmet demand and 9% of the population reported they couldn't get the services they wanted due to cost in 2013, which is 4 times the EU average [19].

⁴ Slovenia is an outlier with non-government regulation and finance along with state provision of services.

Although decreasing, geographical discrepancies are still persistent in Turkey; for example number of doctors per capita is 29% below the national average in Southeastern Anatolia and 42% above the national average in Western Anatolia; for hospital beds per capita the numbers are %19 below and %19 above the national average, respectively [21].

2.2.2. Effectiveness of Turkish Healthcare System

Mortality based indicators like life expectancy or infant mortality rate⁵ have the advantage of capturing the health state of the entire population. On the downside, they are affected by many factors outside the health sector; such as level of education, lifestyle habits of the population and disease vectors that affect countries differently [17].

Figures 2.1 and 2.2 show the life expectancy at birth and infant mortality rates in Turkey and OECD since 1990. In terms of these indicators, Turkish Health System seems to lag behind the OECD average, however, the gap between Turkey and OECD average is closing on both indicators.

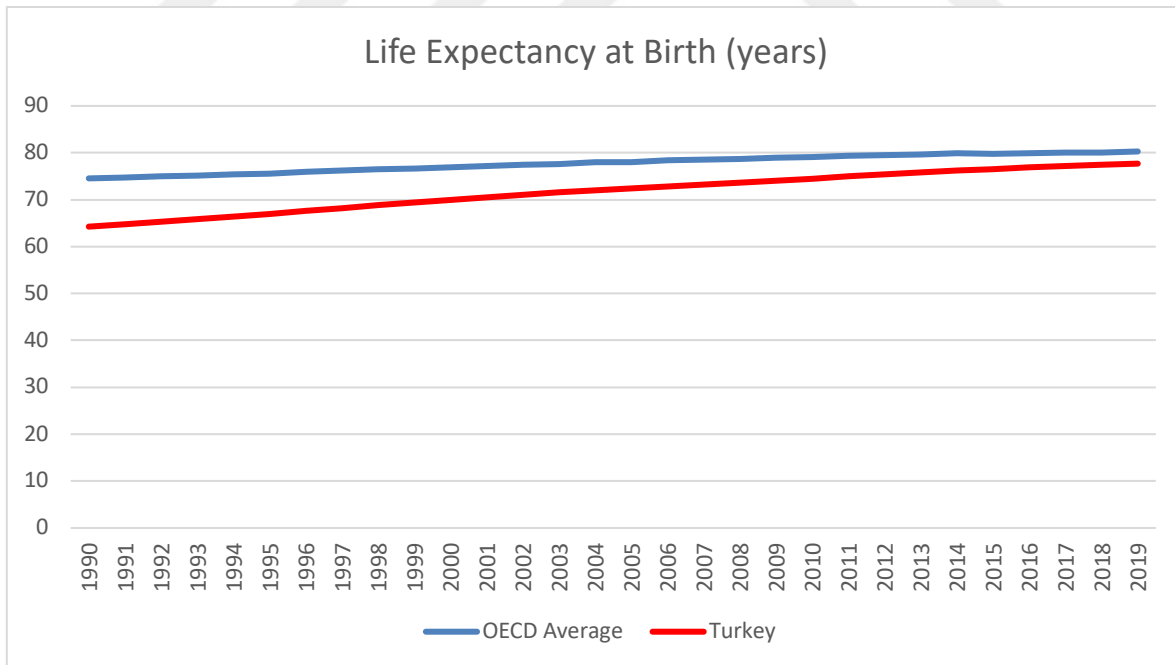


Figure 2. 1: Life Expectancy at Birth in Turkey and OECD [6]

⁵ Infant mortality is death of a child before her/his first birthday. Child mortality is a similar measure is death before fifth birthday.

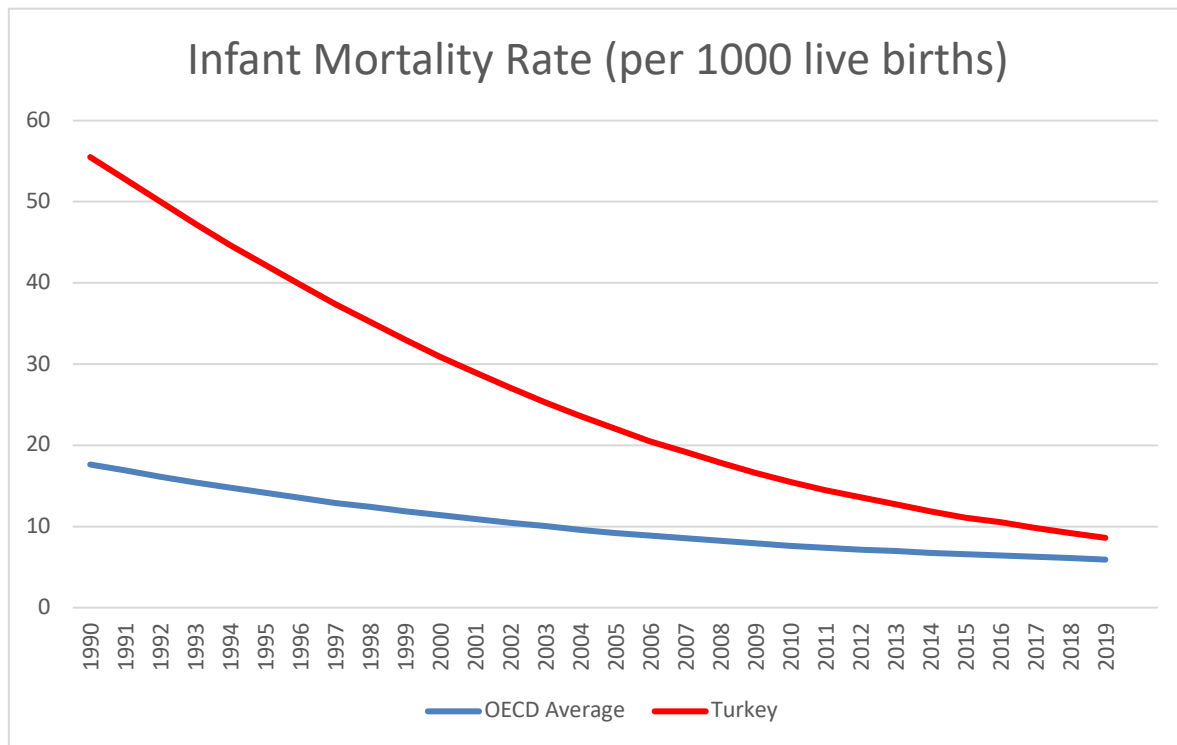


Figure 2. 2: Infant Mortality Rate in Turkey and OECD [22]

Figure 2.3 shows per capita total health expenditure (US\$) vs life expectancy of OECD countries, indicating a strong association between high healthcare expenditure and long life expectancy ($r = 0,41$; significant at 0,01 level of confidence). However, this correlation should not be interpreted as causality. In general, more developed countries have better health outcomes and more funds to spend on healthcare. As the case of US demonstrates, increased expenditure may have little or no effect on overall health status of the population.

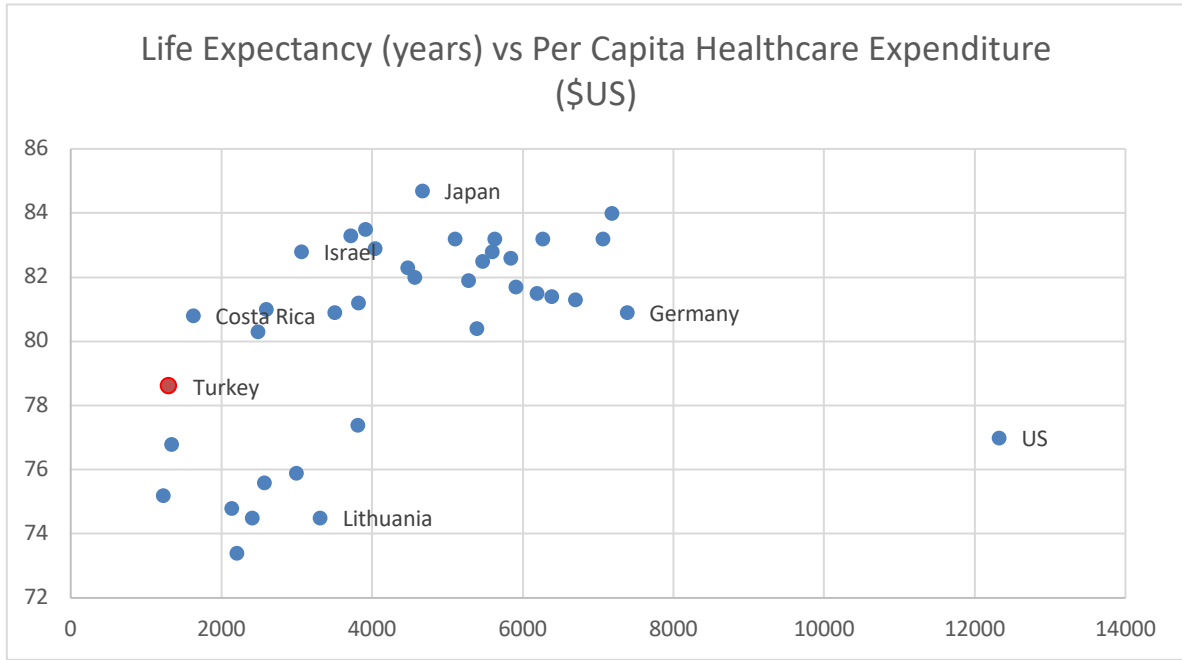


Figure 2. 3: Life expectancy and Healthcare expenditures of OECD countries. [2] [5]

Among OECD countries, Turkey has one of the lowest per capita healthcare expenditure and below average life expectancy. While the performance of the Turkish Healthcare System can be considered above average, it is underachieving due to limited resources.

2.3 Summary of Turkish Healthcare System

There are 1534 hospitals with a total capacity of 231.913 beds in Turkey; 889 of the 1534 hospitals are public hospitals that are owned and operated by the Ministry of Health (MoH), the rest are 68 university hospitals and 577 private hospitals which are overseen by the MoH [23]. Change in number of hospitals, grouped by their ownership is given on Figure 2.4.

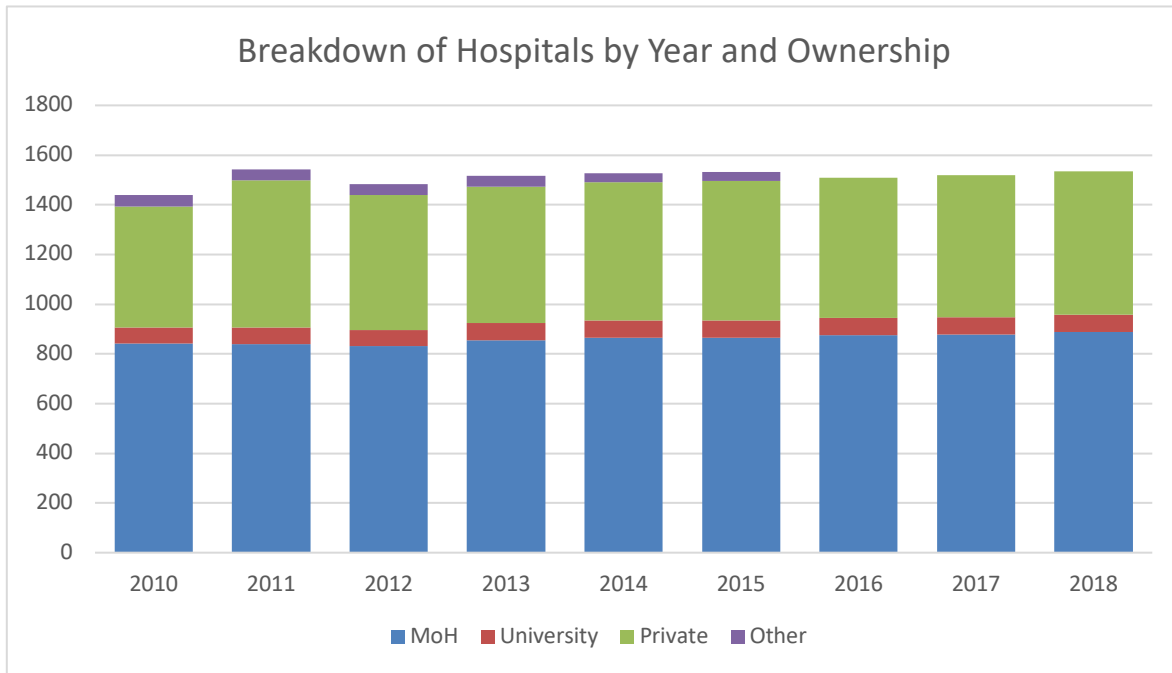


Figure 2. 4: Breakdown of Hospitals by Year and Ownership [24] [23]

As the figure demonstrates, the number of hospitals did not change significantly. The only major change since 2010 occurred in 2016 when the ownership of military hospitals was transferred to the MoH.

Figure 2.5 shows the change in hospital bed capacity, grouped by ownership. A slow but steady increase in the number of total beds can be seen. Another feature is that, when compared with the number of hospitals, the share of university hospitals is larger, and the share of private hospitals is smaller. This is because university hospitals are among the largest hospitals in Turkey while majority of private hospitals are smaller than average.

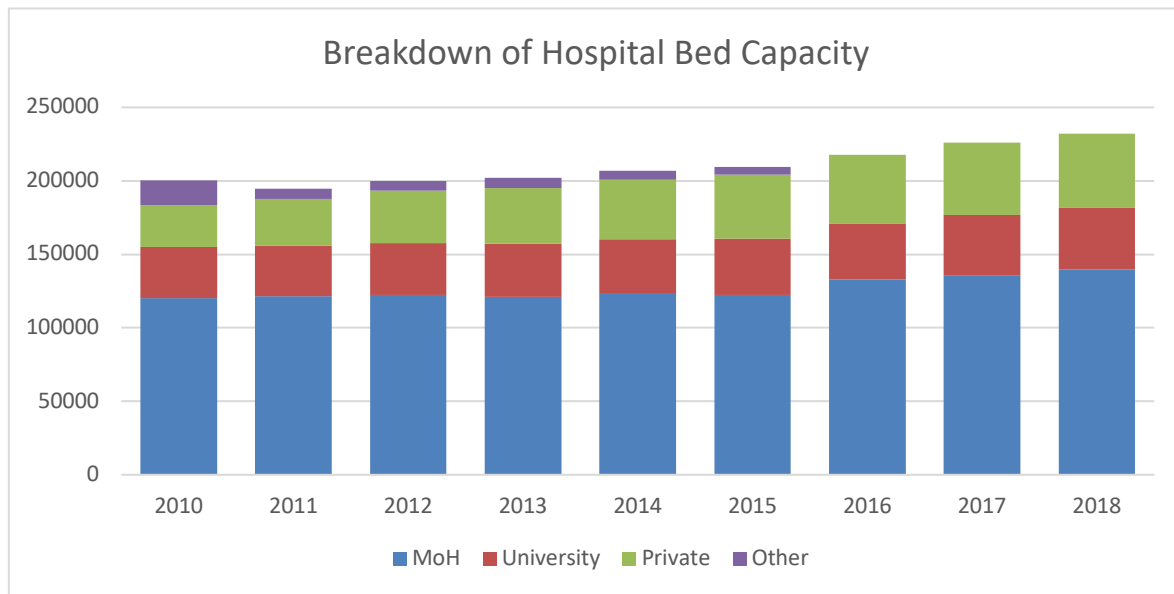


Figure 2. 5: Breakdown of Hospital Bed Capacity by Year and Ownership [24] [23]

Change in the number of Intensive Care Unit (ICU) bed is given on Figure 2.6. It is noticeable that number of ICU beds has more than doubled between 2010 and 2018. In addition, private hospitals have a large share in ICU capacity. This was reportedly caused by poorly designed remuneration scheme which pays ICU treatment even if the patient has next to zero chance of recovery [25].

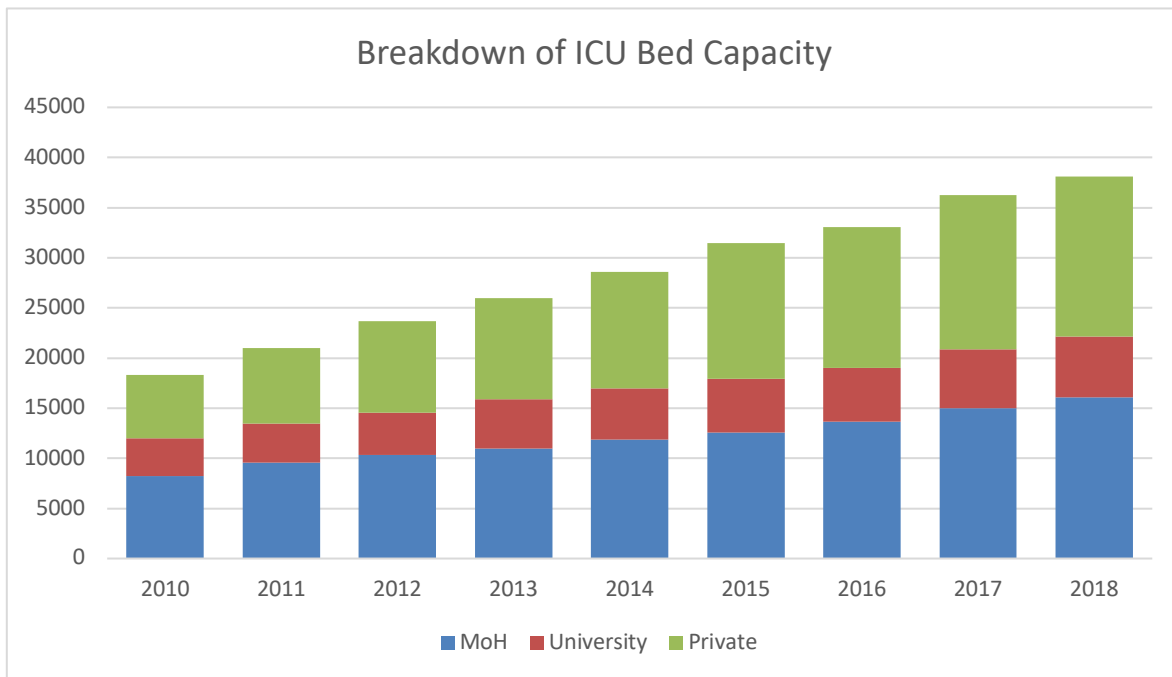


Figure 2. 6: Breakdown of ICU Bed Capacity by Year and Ownership [24] [23]

Number of outpatient visits between years 2010 and 2018 is given on Figure 2.7. It is noteworthy that about two thirds of outpatient visits are made to secondary and tertiary care facilities (medical centers and hospitals). This indicates patients' preference for hospitals and a lack of a functioning referral system.

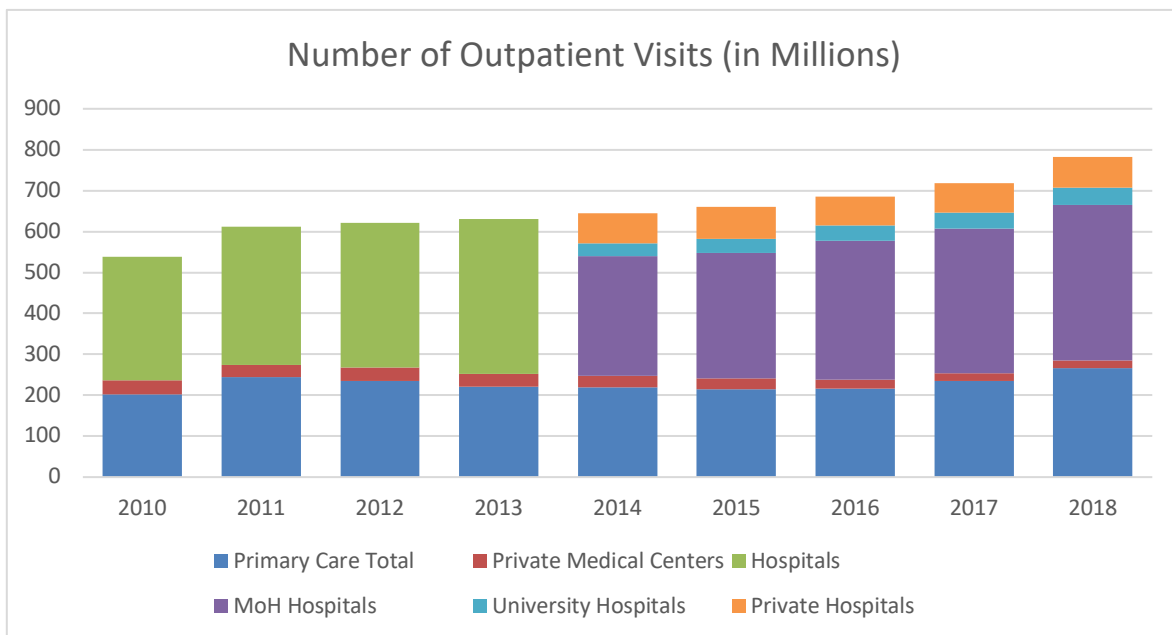


Figure 2. 7: Breakdown of outpatient visits by year and institution type [24] [23]

Number of inpatient stays between years 2010 and 2018 is given on Figure 2.8. An increase in the number of inpatients can be seen between the years of 2010 and 2015, particularly in private hospitals. However, the number seems to stagnate since 2015. This increase is caused by higher utilization rates and shorter average stay, because the number of beds did not increase as Figure 2.5 shows.

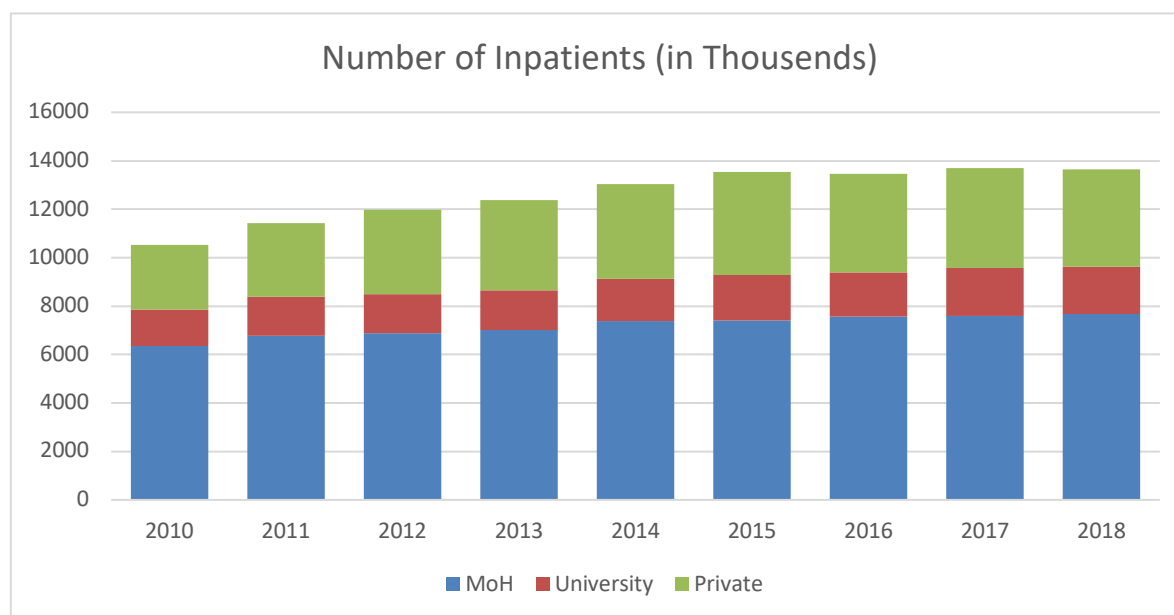


Figure 2. 8: Breakdown of inpatient stays by year and institution type [24] [23]

Hospitals are most important component of the Turkish Healthcare system, they perform all inpatient treatment, two thirds of outpatient services and most of the surgeries. In addition, university and teaching hospitals have essential role in training physicians and medical research.

As of 2019, 65.247 doctors (41.680 specialists, 13.420 GPs, 10.147 residents) and 118.625 nurses are working in MoH hospitals. This represents over two thirds and almost nine tenths of all doctors and nurses employed by the MoH respectively. Within the entire healthcare sector, MoH hospitals employ 49% of all specialists, 41% of all doctors and 60% of all nurses.

This study focuses on hospitals, because they constitute the largest component of the Turkish Healthcare system. However, benchmarking all of the 1534 hospitals against each other will not yield meaningful results. Therefore, this dissertation analyzes only public general hospitals. These hospitals are not only the largest group among hospitals, but they are probably also the most homogeneous one as well; they are all owned and operated by the MoH, their staff have identical pay and benefits and they have the same purpose.

2.4 Health Transformation Program

In 2003 Turkish government has initiated a series of reforms called Health Transformation Program (HTP) to make the healthcare system more effective and equitable [26]. Prior to HTP, there were three different social insurance programs with different regulations on access to healthcare while health expenditures of government employees was paid out of the state budget. As part of these reforms, ownership of all public hospitals (except university hospitals) was transferred to Ministry of Health (MoH)⁶, a universal health insurance scheme was introduced and physicians' reimbursement mechanisms was changed.

While the HTP achieved significant outcomes [27], per capita healthcare expenditure has more than doubled in purchasing power parity (PPP) terms between 2003 and 2018 from \$486 to \$1171 [28].

Although HTP has increased coverage, expanded services and reduced catastrophic healthcare expenditure; there are still concerns regarding women's health, service quality, financial stability and workforce sustainability [29].

⁶Previously, MoH owned only some of the public hospitals; Social Insurance Organization (SSK) owned and operated its own network of hospitals to serve its members and Ministry of Defense owned military hospitals to serve members of the military as well as veterans and their families.

3. LITERATURE SURVEY

This chapter will be divided into three parts: first basic notation and a general overview of Data Envelopment Analysis (DEA) will be presented, then efficiency analysis in the presence of undesirable outputs will be discussed, lastly similar studies will be summarized.

3.1. DATA ENVELOPMENT ANALYSIS (DEA)

The crux of this dissertation is performance measurement. A common benchmark of performance is productivity, which is the ratio of output to input. In the trivial case of single input and output, measurement of productivity is straightforward. However, in the more realistic case of multiple inputs and outputs; which inputs and outputs should be taken into account and how they can be aggregated becomes an issue. Using market prices as weights may seem like a logical choice, however there several problems with this approach. Firstly, market prices may not exist, particularly for public services such as healthcare. Even when they exist, the observed prices may reflect monopoly or monopsony power and include externalities such as environmental impact. Moreover, they may differ over time and across producers. Therefore, a better measure of performance is “efficiency” which is defined as “performance with undominated performance, or operation on the best performance frontier”. [30].

Let’ define “a producer as an economic agent that takes a set of inputs and transforms them either in form or in location into a set of outputs.” [31]. In DEA literature such an agent is called a Decision Making Unit (DMU). Now, let $\mathbf{x} \in \mathbb{R}_+^m$ be the vector of m inputs and $\mathbf{y} \in \mathbb{R}_+^s$ be the vector of s outputs for a DMU. Then a production possibilities set (PPS) or technology function can be defined as: [32]

$$T = \{(\mathbf{x}, \mathbf{y}) \in \mathbb{R}_+^{m+s} | \mathbf{x} \text{ can produce } \mathbf{y}\} \quad \text{Eq. 1}$$

Another representation of the same PPS involves either an input (or consumption) and an output (or production set). Input set $L(\mathbf{y})$ i.e. subset of all input vectors $\mathbf{x} \in \mathbb{R}_+^m$ yielding at least $\mathbf{y}$ can be defined as:

$$L(\mathbf{y}) = \{\mathbf{x} | (\mathbf{x}, \mathbf{y}) \in T\} \text{ or } L(\mathbf{y}) = \{\mathbf{x} | \mathbf{y} \in P(\mathbf{x})\} \quad \text{Eq. 2}$$

Similarly, output set $P(\mathbf{x})$ i.e. subset of all output vectors $\mathbf{y} \in \mathbb{R}_+^s$ that may be produced using $\mathbf{x}$ can be defined as [32]:

$$P(\mathbf{x}) = \{\mathbf{y} | (\mathbf{x}, \mathbf{y}) \in T\} \text{ or } P(\mathbf{x}) = \{\mathbf{y} | \mathbf{x} \in L(\mathbf{y})\} \quad \text{Eq. 3}$$

Isoquants of $L(\mathbf{y})$, $P(\mathbf{x})$ and $T(\mathbf{x}, \mathbf{y})$ are as follows:

$$I(\mathbf{y}) = \{\mathbf{x} | \mathbf{x} \in L(\mathbf{y}), \lambda \mathbf{x} \notin L(\mathbf{y}), \lambda < 1\} \quad \text{Eq. 4a}$$

$$I(\mathbf{x}) = \{\mathbf{y} | \mathbf{y} \in P(\mathbf{x}), \theta \mathbf{y} \notin P(\mathbf{x}), \theta > 1\} \quad \text{Eq. 4b}$$

$$I(\mathbf{x}, \mathbf{y}) = \{(\mathbf{x}, \mathbf{y}) | (\mathbf{x}, \mathbf{y}) \in T(\mathbf{x}, \mathbf{y}), (\lambda \mathbf{x}, \theta \mathbf{y}) \notin T(\mathbf{x}, \mathbf{y}), \theta > 1, \lambda < 1\} \quad \text{Eq. 4c}$$

Moreover, the efficient subsets of $L(\mathbf{y})$, $P(\mathbf{x})$ and $T(\mathbf{x}, \mathbf{y})$ can be defined as:

$$E(\mathbf{y}) = \{\mathbf{x} | \mathbf{x} \in L(\mathbf{y}), \mathbf{x}' \leq \mathbf{x} \text{ and } \mathbf{x}' \neq \mathbf{x} \Rightarrow \mathbf{x}' \notin L(\mathbf{y})\} \quad \text{Eq. 5a}$$

$$E(\mathbf{x}) = \{\mathbf{y} | \mathbf{y} \in P(\mathbf{x}), \mathbf{y}' \geq \mathbf{y} \text{ and } \mathbf{y}' \neq \mathbf{y} \Rightarrow \mathbf{y}' \notin P(\mathbf{x})\} \quad \text{Eq. 5b}$$

$$E(\mathbf{x}, \mathbf{y}) = \{(\mathbf{x}, \mathbf{y}) | (\mathbf{x}, \mathbf{y}) \in T(\mathbf{x}, \mathbf{y}), \mathbf{x}' \leq \mathbf{x} \wedge \mathbf{y}' \geq \mathbf{y} \wedge (\mathbf{x}', \mathbf{y}') \neq (\mathbf{x}, \mathbf{y}) \Rightarrow (\mathbf{x}', \mathbf{y}') \notin T(\mathbf{x}, \mathbf{y})\} \quad \text{Eq. 5c}$$

In other words, isoquants mean that not all inputs can be reduced and/or not all outputs can be increased, while the efficient subsets mean that no input can be reduced, or no output can be increased. The input space representation of the technology function $T(\mathbf{x}, \mathbf{y})$ is given on Figure 3.1, which depicts $L(\mathbf{y})$ and its efficient subset $E(\mathbf{y})$. Note that efficient subset is a stricter definition and $I(\mathbf{y}) \supseteq E(\mathbf{y})$ [32].

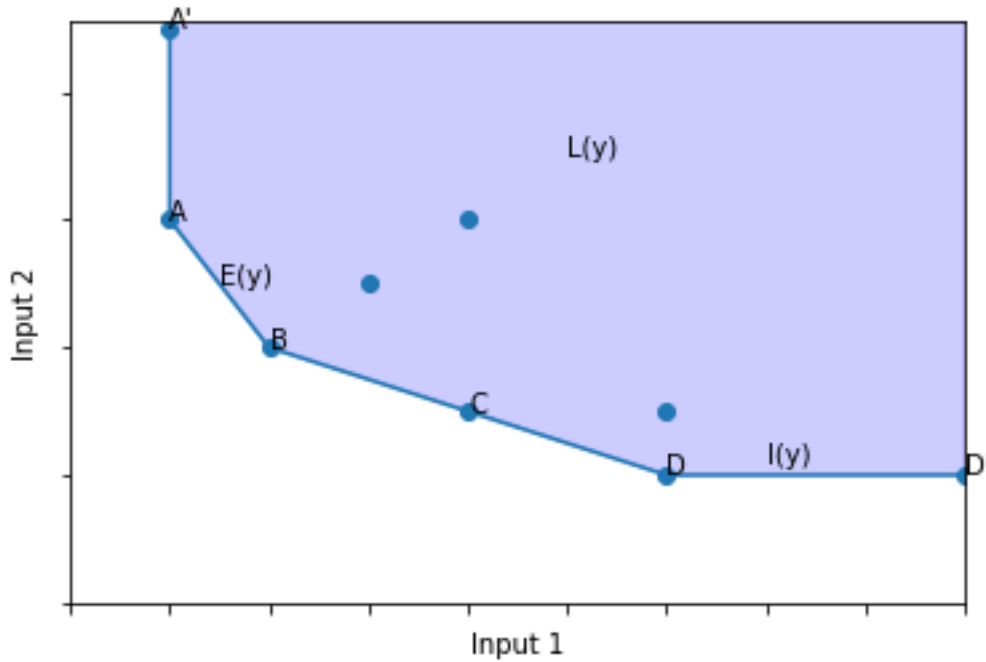


Figure 3. 1: Input Space Representation [32]

Similarly, Figure 3.2 shows the output space representation of the technology function.

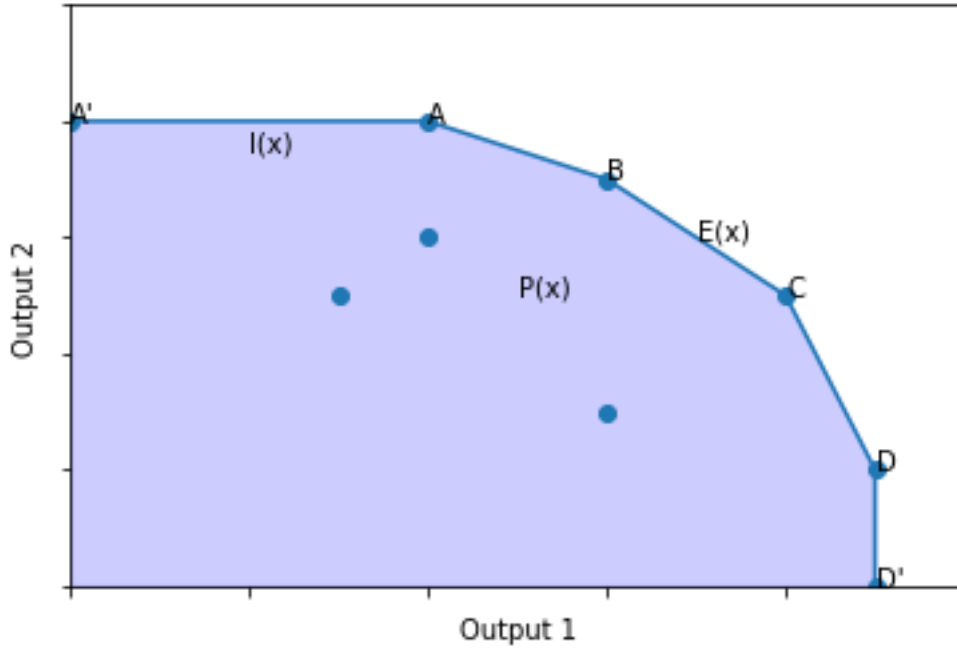


Figure 3. 2: Output Space Representation [32]

Farrell was first to propose using observations to compute an isoquant curve as an estimate of the efficient production function in 1957 [33]. However, Farrell's method used computationally cumbersome matrix inversions. Modern version of DEA, which is based on mathematical programming, was developed in 1978 by Charnes, Cooper and Rhodes (CCR) [34]. The so-called input-oriented CCR model can be represented as [35]:

$$\begin{aligned}
 (DLP_0) \min_{\theta, \lambda} & \theta \\
 \text{subject to } & \theta x_0 = X\lambda \geq 0 & \text{Eq. 6a} \\
 & Y\lambda \geq y_0 & \text{Eq. 6b} \\
 & \lambda \geq 0 & \text{Eq. 6c}
 \end{aligned}$$

The CCR model assumes constant returns to scale, which may not be always the case. In 1984 Banker, Charnes and Cooper [36] proposed adding the constraint $\sum \lambda = 1$ to model constant returns to scale.

3.2. UNDESIRABLE OUTPUTS

Study of productivity with undesirable outputs goes back to at least to 1983 [37] and first DEA model with undesirable outputs was proposed by Färe et al. in 1989 [38]. They point out the distinction between weak and strong disposability. For an output vector $\mathbf{y}$, strong disposability is defined as:

$$\mathbf{y}' \leq \mathbf{y} \in P(\mathbf{x}) \Rightarrow \mathbf{y}' \in P(\mathbf{x}) \quad \text{Eq. 7}$$

This means that if $\mathbf{y}$ can be produced given $\mathbf{x}$, then any $\mathbf{y}'$ can be produced as long as it does not exceed $\mathbf{y}$. On the other hand, weak disposability for the same vector $\mathbf{y}$ is defined:

$$\mathbf{y} \in P(\mathbf{x}) \Rightarrow \theta \mathbf{y} \in P(\mathbf{x}) \forall 0 \leq \theta \leq 1 \quad \text{Eq. 8}$$

This means that only proportional reduction of all outputs is possible. Assuming that it is possible to freely dispose of bad outputs such as pollutants in a production process, is not reasonable. Therefore, their model assumes strong disposability for good outputs $\mathbf{v}$ and weak disposability for bad outputs $\mathbf{w}$. Given $\mathbf{N}, \mathbf{V}$ and $\mathbf{W}$ denote the observed values of inputs, good outputs and bad outputs respectively, the possible output set can be defined as:

$$P(\mathbf{x}) = \{(\mathbf{v}, \mathbf{w}): \mathbf{v} \leq \mathbf{V}\mathbf{z}, \mathbf{w} = \mathbf{W}\mathbf{z}, \mathbf{N}\mathbf{z} \leq \mathbf{x}, \mathbf{z} \in \mathbb{R}_+^K\} \quad \text{Eq. 9}$$

Where $\mathbf{z}$ is $K \times 1$ vector of intensity variables. Note that replacing the equality $\mathbf{w} = \mathbf{W}\mathbf{z}$ with the inequality $\mathbf{w} \leq \mathbf{W}\mathbf{z}$ would give us the model with freely disposable bad outputs and calculating efficiency under both assumptions allows us to measure the effect of the regulations.

Although Färe's seminal work involved computation of conventional hyperbolic productive efficiency measure by solving a nonlinear program, most of the recent studies with undesirable outputs use directional distance function (DDF) approach or slacks-based measure (SBM) model [39].

Directional distance with undesirable outputs model proposed by Chung et al. [40] can be formulated as:

$$\begin{aligned} & \max\{\beta, \lambda\} \beta \\ & \text{Subject to:} \end{aligned} \quad \text{Eq. 10}$$

$$\sum_{j=1}^N \lambda_j g_{r_j} \geq (1 + \beta_0) g_{r_0}, \quad r = 1 \text{ to } R \text{ (Good outputs)} \quad \text{Eq. 11a}$$

$$\sum_{j=1}^N \lambda_j b_{k_j} = (1 - \beta_0) b_{k_0}, \quad r = 1 \text{ to } K \text{ (Bad outputs)} \quad \text{Eq. 11b}$$

$$\sum_{j=1}^N \lambda_j x_{ij} \geq (1 - \beta_0) x_{i_0}, \quad r = 1 \text{ to } I \text{ (Inputs)} \quad \text{Eq. 11c}$$

Note that this model assumes constant returns to scale. Under the assumption of variable returns to scale the constraint $\sum_{j=1}^N \lambda_j = 1$ must be added. This model allows both input contraction and output expansion at the same time.

A similar method is the so called Slack Based Model. This method is non-radial, that is different inputs can contract by different amounts and different outputs can expand by different amounts. Using the notation previously used, Zhu et al.'s model [41] can be expressed with the directional distance function as:

$$\vec{D}(N, V, W; g_1) = \sup\{w_1^T \beta_1 : ((N, V, W) + g_1 \cdot \text{diag}(\beta_1)) \in T_1\} \quad \text{Eq. 12}$$

Where w_1 , g_1 and β_1 are the normalized weight vector, explicit directional vector and scaling vector respectively. Value of $\vec{D}(N, V, W; g_1)$ can be calculated by solving the following model:

$$\vec{D}(N, V, W; g_1) = \max w_{1N}\beta_{1N} + w_{1V}\beta_{1V} + w_{1W}\beta_{1W} \quad \text{Eq. 13}$$

Subject to:

$$\begin{aligned} \sum_{n=1}^N \lambda_{1n} N_{1n} &\leq N + \beta_{1N} g_{1N} \\ \sum_{n=1}^N \lambda_{1n} V_{1n} &\geq V + \beta_{1V} g_{1V} \\ \sum_{n=1}^N \lambda_{1n} W_{1n} &= W + \beta_{1W} g_{1W} \end{aligned}$$

It should be noted that value of $\vec{D}(N, V, W; g_1)$ depends on the direction of g_1 , i.e. a DMU can be efficient in some direction of g_1 while inefficient in others; $\vec{D}(N, V, W; g_1) = 0$ means that the DMU is efficient in the direction of g_1 . In order to obtain a measure of efficiency that is similar to efficiency scores obtained via other methods, we can calculate the following slack based measure:

$$PI = \frac{1 - \frac{1}{2}(\beta_{1V}^* + \beta_{1W}^*)}{1 + \beta_{1N}^*} \quad \text{Eq. 14}$$

Other approaches to treating undesirable outputs include ignoring them, treating them as inputs and applying monotone decreasing transformations [39]. One such transformation is $f(W) = -W$, however defining efficiency scores for negative data is not straightforward. A similar transformation that avoids negative values is: $f(W) = -W + \beta$ s. Unfortunately, choice of β may not only affect rankings, but whether a DMU is efficient or not as well. Another transformation is $f(W) = 1/W$ which is non-linear and hence even more complicated. Methods based on transformations have the disadvantage of unexpectedly producing adverse results. [42]

3.3. DEA STUDIES OF TURKISH HOSPITALS

The first study of Turkish hospitals using DEA is Kavuncubaşı's doctoral dissertation in 1995 where he found three quarters of Turkish hospitals to be ineffective [43].

In 1997 Ersoy et al. [44] measured efficiency levels of 573 acute general hospitals using input oriented CCR [34] method. They found that less than 10% of hospitals were operating at the efficient level. Their study also shows that DEA efficiency scores are consistent with commonly used efficiency indicators.

Atılğan's 2016 study [45] examined inpatient services of 459 acute care hospitals with a bed capacity of at least 25 using Stochastic Frontier Analysis (SFA). His findings show that mid-sized hospitals and hospital in less affluent regions are more efficient. The author argues that inefficiencies on both ends of the size spectrum, may be due to patient behavior of seeking care at the largest hospitals. This study also shows that hospitals in less developed areas are more efficient. While no clear explanation of this phenomenon is provided, excessive allocation of resources in more developed areas and variation in case-mix is listed as possible causes.

In 2017 Erus and Hatipoglu [46] employed a Malmquist decomposition method to determine the effects of the new payment scheme. Their study aggregates data on the provincial level, because some of the data was not available at the hospital level. Their main finding is that

although output has more than doubled between the year 2003 and 2006, most of this increase is not due to change in efficiency.

Yıldız et al. examined 1078 general hospitals, both public and private, using Stochastic Frontier Analysis. Their study emphasized factors of efficiency such as ownership, size, and scope of the hospitals [47]. They found that most efficient hospitals are MoH general hospitals, surprisingly outperforming private hospitals in urban centers, while MoH hospitals in rural areas are the least efficient. University hospitals (both private and public) were found to be less efficient than other hospitals. Considering university hospitals also server for the purposes of training and research, this was expected. However, MoH teaching hospitals were quite efficient.

In 2018 Mollahaliloglu et al. [48] studied the productivity improvement in 458 acute general hospitals between 2001 and 2009 using DEA-based Malmquist approach method. Their emphasis was on the effects of the Health Transformation Program initiated in 2003 and new physician payment scheme implemented in 2005. The outputs used in this study included reciprocal of the gross death rate as a proxy for quality of care and adjusted surgical procedures (an aggregation of all surgical procedures using weights from the Health Services Price list).

In 2019 Yıldırım et al. [49] studied scale and technical efficiencies of 48 MoH general teaching hospitals using the BCC [36] model. Outputs used in this study included reciprocal of the gross death rate which is an undesirable output. They concluded that there are 15 efficient hospitals. Among the 33 inefficient hospitals; 9 hospitals are pure technically efficient scale inefficient, 13 are scale efficient but technically inefficient, and 11 hospitals are both pure technical and scale inefficient.

Cinaroglu's 2019 study [50] involves two steps: First 81 provinces are clustered based on their welfare indicators, then 688 public hospitals benchmarked within their cluster using DEA. Using 5 groups based on the clustering, the author shows that public hospitals in metropolitan areas have low efficiency scores and suggests that welfare dynamics should be considered when allocating health resources.

Also in 2019, Karahan [51] tried to determine efficiency levels of all public hospitals using the BCC [36] model on the provincial level. Unlike most other studies, Karahan's work includes bed turnover rate and death rate as outputs. According to this study among 11 input and output variables, bed turnover rate has the highest correlation with efficiency score. Moreover, rural and urban provinces have similar levels of efficiency.

Emergency departments of 7 hospitals were analyzed by Akkan et al. in 2020 [52]. Their study is unique in two ways; first they focused on emergency departments and they examined the effects of seasonality by treating each season in the same hospital as a different DMU. This manuscript also includes determination of the best DEA model alternating least-squares algorithm (ALSCAL) and Principal Component Analysis (PCA).

A summary of these studies can be seen on table 3.1. These publications show that various DEA methods can be used to benchmark hospitals both on an individual basis and on an aggregated basis, as well as departments of hospitals.

In healthcare efficiency analysis, the focus should be on the outcomes of care as opposed to levels of output [53]. If the quality or effectiveness of services provided by different institutions are not equal, it is necessary to take these differences into account; because simply increasing the number of services rendered such as outpatient visits, may not yield an increase in overall health of the society. Unfortunately, all the works cited in this section measure efficiency based only on output levels. Although methods are available to measure health outcomes [54], most of the data to perform these analysis are not available. This study uses risk-adjusted mortality as an indicator of quality for services rendered.

Table 3. 1: Summary of some previous DEA studies in Turkish healthcare

Author(s)	Title	Year	DMU	Method	Inputs	Outputs
Emre Atılgan	The Technical Efficiency of Hospital Inpatient Care Services: An Application for Turkish Public Hospitals	2016	acute-care hospitals	Stochastic Frontier Analysis	Physicians Ancillary Medical Staff Non-medical staff	inpatients patient days
Burçay Erus, Ozan Hatipoğlu	Physician payment schemes and physician productivity: Analysis of Turkish healthcare reforms	2017	Provinces	DEA-based Malmquist	Beds Specialists Part-time specialists Practitioners	Outpatient visits Inpatient visits Inpatient visits (case-mix adjusted) Surgeries
Mustafa S. Yıldız, Vahé Heboyan, M. Mahmud Khan	Estimating technical efficiency of Turkish hospitals: implications for hospital reform initiatives	2018	Hospitals	Stochastic Frontier Analysis	Beds Physicians Other medical and tech. staff administrative staff ICU beds	Surgeries Inpatient days ICU utilization Deliveries Bed utilization Device utilization outpatients
Saleh Mollahaliloglu, Sahin Kavuncubasi, Fikriye Yılmaz, Mustafa Z. Younis, Fatih Simsek, Mustafa Kostak, Selami Yildirim, Emeka Nwagwu	Impact of health sector reforms on hospital productivity in Turkey	2018	acute general hospitals	DEA-based Malmquist	Specialists Practitioners Beds	Outpatient visits Gross death rate (GDR) Surgical procedures
Cuma Yildirim, Hakan Kacak, Selami Yildirim, Sahin Kavuncubasi	Comprehensive Efficiency Assessment of Turkish Teaching Hospitals: Technical, Pure Technical and Scale Efficiencies with Data Envelopment Analysis	2019	MoH general teaching hospitals	BCC	beds specialists nurses	outpatients inpatients weight adjusted surgeries 1/Ex-cases
Songul Cinaroglu	Integrated k-means clustering with data envelopment analysis of public hospital efficiency	2019	Public hospitals	input-oriented CCR	Beds Physicians Nurses and midwives	inpatients Outpatient visits surgeries
Mehmet Karahan	Using Data Envelopment Analysis to Measure the Technical Efficiency of Public Hospitals in Turkey	2019	Provinces	BCC	Total Number of Beds Number of hospitals Specialists Practitioners nurses Other Health Personnel	Total patients Number of Surgeries inpatients Bed Turnover Rate Rough Death Rate
Can Akkan, Melis Almula Karadayi, Yeliz Ekinci, Füsün Ülengin, Nimet Uray, Elif Karaosmanoğlu	Efficiency analysis of emergency departments in metropolitan areas	2020	Emergency Departments	CCR & BCC	Level of ED Number of beds	Number of patients Number of Referrals

4. ANALYSIS

As of 2009 there were 1205 hospitals of all types and in Turkey. In order to benchmark similar hospitals with each other, it was aimed to keep the dataset as homogenous as possible without making it too small. Firstly, hospitals that are not owned by the MoH, namely 332 private hospitals, 56 university hospitals, 42 military hospitals and 6 hospitals being operated by municipalities⁷ were excluded in this study. Moreover, 246 MoH hospitals were not included, either because patient satisfaction survey was not conducted, or input/output data were not available. In addition, specialty hospitals are removed to obtain a more homogenous set of DMUs. Lastly, because a mortality-based quality measure is used, 75 hospitals where no deaths were recorded are excluded, reducing the size of the dataset to 330 general hospitals in provincial areas.

4.1 MODEL

Number of variables is 21; 6 inputs, 14 (good) outputs and 1 undesirable output. Names and definitions of these variables are given on table 4.1.

Five of the six input variables are different types of labor, while number of beds represents physical capital invested in a hospital. The outputs consist of number of inpatients and outpatients as well as five variables for different types of surgeries, three variables for different kinds of day care procedures such as dialysis and three variables for births. Unlike some of the similar studies, inpatient days were not included as an output. There are two reasons for this choice: firstly, inpatient days and number of inpatients are highly correlated; more importantly, for any given patient, staying more days in the hospital means the care received was less efficient in improving her/his health. Similarly, diagnostic services such as x-rays or lab work is not included as inputs, because they do not improve patients' health. The last variable is death/inpatient ratio which is the sole undesirable output.

⁷ Ownership of military hospitals and municipality hospitals are now transferred to MoH.

Table 4. 1: Input and output variables

	Variable	Definition
Inputs	Beds	Number of staffed beds
	Doctors	Total number of physicians i.e. specialists and general practitioners
	Nurses	Total number of nurses including midwives
	Other health care providers	All other medical personnel, includes dentists, pharmacists, medical technicians, medical radiological technologists, dietitians, etc.)
	Administrative personnel	Full time employed non-medical personnel, mostly in clerical roles but includes some in technical personnel like engineers.
	Support personnel	Total number of workers in other support roles, includes data entry, maintenance, security and housekeeping etc.
Outputs	Outpatients	The total number of visits to outpatient clinics and emergency rooms
	Inpatients	The total number of inpatients
	Chemotherapy	Number of chemotherapy treatments
	Radiotherapy	Number of radiotherapy treatments
	Dialysis	Number of dialysis treatments
	Else	Total number of other treatments (e.g., physical therapy)
	A	These represent surgeries performed in 5 levels of difficulty as classified by MoH, A being most complex (such as kidney transplant or mitral valve reconstruction) and E being the least complex (e.g. long leg plaster)
	B	
	C	
	D	
	E	
	Normal births	Total number of normal deliveries
	Surgical births	Total number of surgical deliveries
	Cesarean births	Total number of cesarean deliveries
	D/Inpatients ratio	Number of deaths divided by total number of inpatients (undesirable output)

4.1.1 Summary Statistics

Table 4.2 summarizes the input variables in the dataset while appendix A has the entire dataset. Despite all being state hospitals, size of the DMUs varies considerably. This variation in DMU size allows the calculation of scale inefficiencies.

Table 4. 2: Summary statistics of input variables

	Doctors	Nurses	Other health care providers	Administrative Personnel	Support Personnel	Beds
Minimum	5	22	2	4	0	25
Maximum	245	2547	201	341	714	978
Mean	50.1	160.2	23.5	56.6	140.1	158.8
St. Dev.	46.1	195.2	24.1	58.1	144.8	163.6

The hospitals in the data set can be broken down to groups according to their bed capacity. Average inputs of each group is given on Table 4.3 which shows that all inputs increase more or less uniformly with hospital size, with the exception of other staff (clerical and operational workers) which tends to increase far more rapidly than hospital size, suggesting that more bureaucracy is needed to run a larger hospital. On the other hand, patient satisfaction tends to decrease as hospitals get larger, which may be due to a number of reasons; e. g. smaller hospitals tend to be in smaller towns where populations are less demanding.

Table 4. 3: Break-down of inputs according to hospital size

Size (beds)	Number of Hospitals	Beds	Doctors	Nurses	Other health professionals	Other staff	Patient satisfaction
≤50	100	37	15	54	8	49	0,917
51-100	80	72	26	83	14	95	0,903
101-200	56	144	50	143	22	186	0,895
201-300	40	248	78	242	37	309	0,881
301-400	22	340	106	292	47	460	0,851
≥400	32	547	146	523	68	925	0,86

A similar break down for output variables are given on table 4.4. As expected, all outputs tend to increase with hospital size. However, some outputs such as number of outpatients or day treatments (mostly dialysis but includes radiotherapy and chemotherapy as well) tend to increase less than the increase in the number of beds, while outputs such as number of inpatients or surgeries tend to increase at a greater rate than number of beds, suggesting larger hospitals tend to face a more complex case mix.

Table 4. 4: Break-down of inputs according to hospital size

Size (beds)	Inpatients	Outpatients	Day treatments	Other treatments	Surgeries	Births			D/Inpatient
						Normal	Surgical	Cesarian	
≤50	1409	115253	470	1372	805	108	18	38	0,0071
51-100	3326	204355	1002	2067	1943	301	44	152	0,0061
101-200	7576	355848	1967	8445	5458	485	82	363	0,0072
201-300	12119	527679	2106	4328	9127	645	30	547	0,0135
301-400	16712	679252	3629	10390	12902	852	42	677	0,013
≥400	25328	876454	4704	17720	20859	827	41	887	0,0191

This point can be seen more clearly on a breakdown of surgical operations by their complexity. MoH classifies surgical procedures to 5 categories, from A (most complex such as tumor excision or liver transplant to E (least complex such as removal of debris from soft tissue laceration). As it can be seen on table 4.5, as hospitals get larger, share of major surgeries gets larger as well.

Table 4. 5: Average number of surgery types on different sizes of hospitals

Size (beds)	A	B	C	D	E
≤50	5 (0,6%)	64 (8,0%)	157 (19,5%)	194 (24,1%)	385 (47,8%)
51-100	45 (2,3%)	197 (10,1%)	512 (26,4%)	512 (26,4%)	677 (34,8%)
101-200	91 (1,7%)	639 (11,7%)	1382 (25,3%)	1305 (23,9%)	2041 (37,4%)
201-300	167 (1,8%)	1266 (13,9%)	2209 (24,2%)	2178 (23,9%)	3307 (36,2%)
301-400	381 (3,0%)	1942 (15,1%)	3239 (25,1%)	2612 (20,2%)	4728 (36,6%)
>400	694 (3,3%)	3203 (15,4%)	5173 (24,8%)	4907 (23,5%)	6882 (33,0%)

4.1.2 Inpatient Satisfaction Survey

As mentioned in Chapter 2, MoH uses a performance-based payment system which uses, among other metrics, Inpatient Services Evaluation Survey to determine the performance of a hospital. This survey is conducted annually by the MoH and its 2009 results are used in this study as a measure of quality. The survey consists of 39 questions, in 9 categories. Categories, number of questions in each category and total points in each category are summarized on Table 4.6

Table 4. 6: Categories of questions on the inpatient satisfaction survey

Category	Number of questions	Points
Demographics	8	0
Admission	3	8
Facilities	5	16
Physicians	3	8
Nurses	4	11
Medical care	6	21
Discharge	2	6
General evaluation	4	18
Other	4	12
Total	39	100

Questions in the survey have varying weights from 2 to 6 (with the exception of demographic questions which have no effect on the survey result). They also vary in number of possible answers, for example: Question 31 “Were you given a phone number to contact the clinic you were treated?” has only two possible answers; “yes” (3 points) and “no” (0 points), on the other hand Question 34 “In general, how would (x,y)you rate the treatment you received?” has five possible answers; “perfect” (5 points), “very good” (4 points), “good” (2 points), “average” (1 point) and “poor” (0 points).

4.2 EFFICIENCY ESTIMATES

Using the directional distance model discussed in chapter 3; Constant Returns to Scale (CRS), Variable Returns to Scale (VRS)-strong and VRS-weak inefficiencies are calculated

using three different direction vectors: the DMU itself (x, y) , average of DMUs $(\bar{x}, \bar{y})$, and the unit vector. The difference between the CRS and VRS-strong inefficiencies yields the scale inefficiency. Similarly, subtracting the VRS-weak inefficiency from VRS-strong inefficiency yields congestion inefficiency.

4.2.1. Decomposition of Inefficiencies

Inefficiency estimates using $g = (x, y)$ are given on Appendix B and summary table of results are given on Table 4.7. Table 4.8 and Table 4.9 summarize the results using $(\bar{x}, \bar{y})$ and the unit vector $(1, 1)$, respectively.

When interpreting these results, the choice of the direction vector must be kept in mind. For example, on Table 4.7 it looks like all types of inefficiencies tend to decrease as hospital size increases. However, this is misleading, because the inefficiency scores are given as a fraction of the DMU's input and output levels. The opposite is true for Table 4.8, inefficiencies seem to increase with hospital size, because the scores are given as a fraction of the average input and output level.

Table 4. 7: Inefficiency estimates using $g = (x, y)$

Size Class (beds)	# of Hospitals	CRS	VRS- strong	VRS- weak	Scale	Congestion
# efficient		136	200	222	136	263
<=50	100	0,092	0,025	0,013	0,066	0,0123
51-100	80	0,071	0,051	0,042	0,02	0,0092
101-200	56	0,044	0,037	0,034	0,006	0,0037
201-300	40	0,045	0,033	0,031	0,012	0,0016
301-400	22	0,05	0,033	0,028	0,017	0,0054
401+	32	0,038	0,015	0,012	0,023	0,0026
Overall Average		0,065	0,034	0,027	0,031	0,007
Overall SD		0,084	0,061	0,057	0,055	0,022

Table 4. 8: Inefficiency estimates using $g = (\bar{x}, \bar{y})$

Size Class (beds)	# of Hospitals	CRS	VRS-Strong	VRS-weak	Scale	Congestion
# efficient		136	200	222	136	264
<=50	100	0,017	0,006	0,003	0,012	0,0028
51-100	80	0,025	0,019	0,015	0,006	0,0039
101-200	56	0,031	0,027	0,024	0,004	0,0031
201-300	40	0,061	0,041	0,038	0,02	0,0022
301-400	22	0,099	0,061	0,049	0,038	0,012
401+	32	0,102	0,035	0,028	0,067	0,007
Overall Average		0,041	0,023	0,019	0,017	0,004
Overall SD		0,071	0,052	0,049	0,04	0,018

Table 4. 9: Inefficiency estimates using $g = (1,1)$

Size Class (beds)	# of Hospitals	CRS	VRS-strong	VRS-weak	Scale	Congestion
# efficient		121	190	213	119	191
<=50	100	1,81	0,656	0,001	1,153	0,655
51-100	80	2,524	1,904	0,003	0,62	1,901
101-200	56	2,69	2,319	0,003	0,371	2,316
201-300	40	5,384	4,381	0,006	1,003	4,375
301-400	22	8,494	5,795	0,003	2,699	5,792
401+	32	7,987	3,224	0,003	4,763	3,221
Overall Average		3,61	2,284	0,003	1,326	2,281
Overall SD		6,019	4,845	0,006	2,946	4,842

Using both (x, y) and $(\bar{x}, \bar{y})$ vectors, same 136 hospitals are found to be CRS efficient, further 64 are found to be VRS efficient.

Using the unit vector, the number of CRS efficient hospitals decreases by 15 to 121, while the number of VRS efficient hospitals decreases by 10 to 190. It is noteworthy that set of efficient hospitals using the unit vector is a subset of efficient hospitals using (x, y) or $(\bar{x}, \bar{y})$ vectors, showing that at least in this application, unit vector is a more exacting method.

Regardless of the chosen direction vector, scale inefficiency seems to have a U shaped curve. Implying most efficient scale of production is 101-200 bed range. Similar findings were reported in Atilgan's 2016 study [45]. While it is easy to assume that smaller hospitals are not operating at an efficient scale, larger hospitals might be appearing inefficient, because they are facing a more complex case mix as explained previously.

4.2.2 Analysis of Inefficient Hospitals

Other inefficiency scores decrease when moving from the second largest (301-400) to largest (>400) category. In particular, lower congestion scores are noteworthy. Assuming the largest hospitals have more varied specialists and more sophisticated equipment to handle complex cases referred to them, we can conclude that these hospitals have more diverse resources as opposed to having more of the same. This is consistent with the assumption that congestion is a mix problem.

Moreover, using the unit vector, VRS-weak inefficiency scores tend to be much smaller than the VSR-strong inefficiencies, showing high levels of congestion. Considering values of mortality are several orders of magnitude smaller than values of other inputs and outputs, forcing to use natural units is more likely to have caused incompatibilities in the input/output bundle.

The model used in this study is first used to measure environmental performance of fossil-fuel-fired electric utilities [55]. In the environmental economics setting, undesirable output is pollution and congestion measures the cost of pollution reduction. In this study, which is in a healthcare setting, undesirable output is mortality. Congested hospitals are the ones that have difficulty in coping the weak disposability assumption, and these will be the ones that cannot provide adequate quality of service.

It is expected that congested hospitals are the ones that fail to deliver expected level of service and have low scores on the inpatient satisfaction survey. In order to test this hypothesis, correlations between the congestion scores and patient satisfaction levels were calculated for hospitals with non-zero congestion inefficiency scores. Results for both simple correlation and rank correlation are given on Table 4.10. All correlation coefficients are negative and

significant, indicating hospitals with congestion have low inpatient satisfaction levels as predicted.

Table 4. 10: Correlations between congestion scores and inpatient satisfaction levels

	# of Congested Hospitals	Simple Correlation	t-value	Rank Correlation	t-value
(x, y)	67	-0,24	-1,95	-0,19	-1,58
$(\bar{x}, \bar{y})$	66	-0,22	-1,81	-0,33	-2,76
$(1,1)$	139	-0,24	-2,89	-0,21	-2,53

Let's denote VRS-Strong projection to the efficient frontier as S and VRS-Weak projection as W. The difference between these two ($S - W$) will give us congestion which can be thought of having two components; the reduction in mortality and the “price” of that reduction, or how much input increases or reduction in desirable outputs is necessary to obtain that reduction.

Note that if VRS-strong optimum may occur on the horizontal (or vertical) part of the mortality axis. In such a case, calculated congestion score will be zero although the DMU is actually congested. There are 4 hospitals that fall into this category using $(\bar{x}, \bar{y})$ and 6 hospital when using either (x, y) or $(1,1)$ (same four as $(\bar{x}, \bar{y})$ plus two additional).

4.3 CONGESTION AND ITS DETERMINANTS

As previously mentioned, the difference between the strong vs. weak disposability assumption is that under strong disposability undesirable outputs can be freely reduced like other outputs, while under weak disposability removal of bad outputs requires reducing other outputs as well and/or use of additional resources (inputs). The mathematical model of the strong disposability model has “greater than or equal to” constraint(s) for bad outputs, while weak disposability model has the same constraint(s) as an equality. For some DMUs, “greater than or equal to” constraint in the VRS-S will be at the equilibrium and these will have zero congestion scores. However, for others the equality constraint in the VRS-W model would force the DMU to trade-off.

For these hospitals, we can decompose the $(S - W)$ vector into two parts: a positive mortality (undesirable output) component and the rest which indicates the cost of attaining the reduction in mortality. It's natural to expect that this second component is non-negative because it is what we are giving up to reduce mortality. In other words; because weak disposability is a more stringent assumption, hence it is expected that under that assumption inputs would be less, and outputs would be more, i.e. $(S_y > W_y)$ and $(S_x < W_x)$. However, it is possible that under weak disposability some inputs decrease and/or some outputs increase. In that case second component of the $(S - W)$ vector will have some negative terms. In fact, examination of our data show that while the $(S - W)$ vector is entirely non-negative for only 25 hospitals, it includes both positive and negative terms for the rest.

4.3.1 Types of Congestion

These 25 hospitals that require increase across the board increase in inputs and/or reduction of outputs to achieve the mortality reduction prescribed by the model. We can assume these hospitals are operating at full capacity under the strong disposability assumption and mortality reduction (i.e. moving from strong to weak disposability) requires additional resources or giving up some productivity.

The majority of hospitals⁸ with congestion have at least one negative component in their $(S - W)$ vector, meaning mortality reduction can be accompanied by reduction of at least one input and/or expansion of at least one output. Former means cost of mortality reduction is additional outputs, while the later means additional inputs are causing an increase in mortality. Both of these can be interpreted as negative marginal productivity.

It is important to distinguish between two types of congestion: namely *capacity constrained* DMUs which require reduction of outputs and increase in inputs to increase quality of care, and *negative marginal productivity* DMUs which can reduce mortality while simultaneously increasing some outputs and/or decreasing some inputs. The former is likely caused by overstretching resources, i.e. the hospital is operating at a level where quality of care is being sacrificed, while the later is caused by having wrong mix of inputs or outputs.

⁸ 48 under (x, y) 120 under $(1, 1)$ and 45 $(\bar{x}, \bar{y})$

4.3.1 Migration and Congestion

To investigate the causes of these two different types of congestion, population change between years 2007 and 2010 of the two groups were analyzed and the results are presented on table 4.11.

Table 4. 11: Congestion types and population change during 2007-2010

Direction vector	Congestion type	N	Mean population increase	Variation of population increase	Z value
(x, y)	capacity constrained	25	-0,01	0,02	2,53
	negative marginal productivity	48	0,06	0,02	
$(\bar{x}, \bar{y})$	capacity constrained	25	-0,01	0,02	2,69
	negative marginal productivity	45	0,07	0,02	
$(1,1)$	capacity constrained	25	-0,01	0,02	4,11
	negative marginal productivity	129	0,08	0,02	

Considering the average population increase between years 2007-2010 is 3,8% [7], capacity constrained hospitals tend to be in provinces where people are emigrating from and negative marginal productivity hospitals tend to be in provinces where people are immigrating to. One possible explanation for this is, provinces with negative population increase cannot retain healthcare workers and are chronically understaffed, hence they cannot deliver demanded healthcare services at desired levels of quality.

On the other hand, negative marginal productivity in provinces people are immigrating to suggests that wrong case of inputs is utilized in these provinces. This highlights difficulties of allocating resources when demand is rapidly increasing.

Migration in Turkey is mostly from rural to urban areas; hence it can be argued that capacity constrained hospitals are mostly in rural areas, while negative marginal productivity hospitals are in urban areas. As mentioned on chapter, 3 Yildiz et al [47] reported that public hospitals in urban areas are most efficient. On the other hand, Cinaroglu's [50] study claims metropolitan public hospitals have low efficiency levels. This study shows the urban rural

dichotomy is the existence of two different types of inefficiency, not hospitals in one setting being more efficient than the other.

4.4 ENDOGENOUSLY DETERMINED DIRECTION VECTORS

As previous discussion shows, choice of direction vector is a factor in the efficiency scores. In addition to the three direction vectors discussed earlier, the following can also be used [56]:

- Outputs or inputs only, i.e., $(0, y)$ or $(x, 0)$
- A vector determined by policy directive or derived from social welfare function
- Endogenously determined (g_x, g_y) to minimize the distance to the efficient frontier.

Figure 4.1 shows these vectors. Solid black arrows are $(0, y)$ and $(x, 0)$ respectively, dashed black arrow is (x, y) and the red arrow is the endogenously determined shortest distance to the efficient frontier.

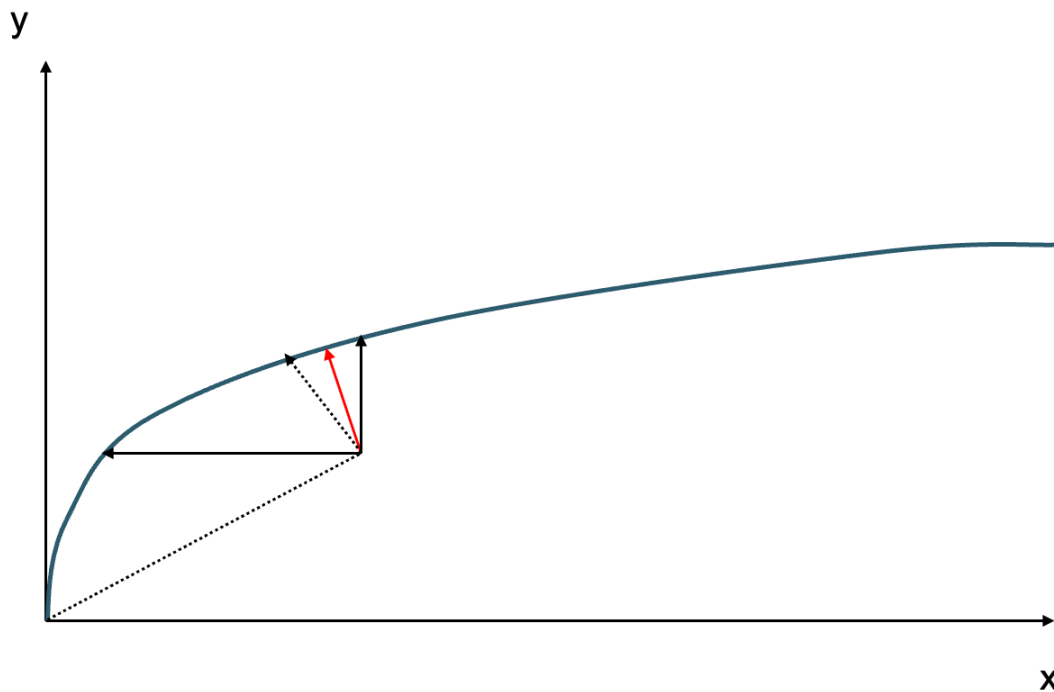


Figure 4. 1: Direction vectors

Considering all 330 hospitals in our dataset are owned and operated by the MoH, determining the optimal vector to the efficient frontier can have important policy implications. Resource allocation problem of MoH actually has two parts; it has to determine the aggregate level of inputs and it has to distribute these inputs among different hospitals. Determining the shortest distances to the efficient frontier and aggregating these vectors can provide policy guidelines on the aggregate level, particularly for inputs.

Fare et al. [57] suggest the following method to determine the optimal directional vector.

$$\text{Let } \beta = \frac{\beta^*_1}{g_1} = \frac{\beta^*_2}{g_2} = \dots \text{ and } g_1 + g_2 + \dots = 1 \quad \text{Eq. 55}$$

Once β s are calculated, the optimal directional vector g can be determined by using the following:

$$g_1 = \frac{\beta^*_1}{\beta^*_1 + \beta^*_2 + \dots}, g_2 = \frac{\beta^*_2}{\beta^*_1 + \beta^*_2 + \dots}, \dots \text{ etc.} \quad \text{Eq. 66}$$

4.4.1 Data Normalization

It should be noted that this method assumes each unit of input or output has the same distance. In a case where each variable has the same weight, this might be valid; however, in this study the values of most input variables are 2 or 3 orders of magnitude smaller than the output with the largest values (outpatients), and 3 orders of magnitude larger than the (undesirable) output with the smallest values (D/I ratio). To address this issue, all variables are normalized by dividing the average value for that variable. For example, average number of nurses is 160 in the dataset, hence the nurse variable of a DMU with 120 nurses is replaced with $120/160 = 0.75$.

4.4.2 Results of the Endogenously Determined Direction Vector Model

Results using the endogenously determined direction vectors, along with other direction vectors is given on Appendix C. Under the assumption of weak disposability, the results are very similar to the results obtained using the average vector $(\bar{x}, \bar{y})$: 135 of the 330 hospitals are found to be efficient, and all of these 135 are among the 136 found efficient using $(\bar{x}, \bar{y})$ ⁹. β 's obtained with these two methods are highly correlated a correlation coefficient of 0.878.

⁹ The DMU that is not efficient using the endogenous vector is Antalya Kaş State Hospital

Correlations of the β 's obtained using endogenous vectors and previously discussed methods is given o Table 4.12

Table 4. 12: Correlations of β 's obtained using different directional vectors

	(x, y)	$(\bar{x}, \bar{y})$	$(1,1)$	Endogenous
(x, y)	1,000	0,485	0,481	0,384
$(\bar{x}, \bar{y})$	0,485	1,000	0,949	0,878
$(1,1)$	0,481	0,949	1,000	0,853
Endogenous	0,384	0,878	0,853	1,000

Summary statistics of the 195 optimized direction vectors are given on table 4.13. Radiotherapy and chemotherapy are most frequently seen variables in addition to having the highest average. Indicating many hospitals have excess capacity to provide additional services of these types. However, it should be noted that having some excess capacity in geographically remote areas might be preferred over ambulating patients to other locations. Relatively high amount of output expansion is also ascribed for births (in particular, non-caesarian births) and major surgeries. Again, these are procedures where having some excess capacity might be preferred over not having enough at a geographical location.

Endogenously determined distance vectors are ascribing an input reduction of 0,9% and output expansion of 6,9% on average. This is consistent with the actual expansion of the Turkish healthcare system: Between years 2010 and 2019 total number of outpatient visits increased by 50,8% (from 539M to 813M) while number of inpatient stays increased by %31,4 (10,5M to 13,8M) on the other hand, number of physicians has increased only by 18,6% (from 135616 to 160810) [21]. Considering the increase and ageing of the population during these years, it is natural assume that MoH has never sought to reduce inputs.

It should also be noted that doctors variable has the lowest average and is second least frequent; indicating reduction of doctors is almost never recommended, which is consistent with the chronic shortage of physicians in Turkey.

Table 4. 13: Summary statistics of the optimized direction vectors

Variable	Occurrences	Average
Beds	157	0,0115
Doctors	84	0,004
Nurses	161	0,011
Other HC professionals	85	0,0079
Administrative	136	0,0155
Support	90	0,0037
Inpatients	126	0,0054
Outpatients	66	0,0027
Chemotherapy	190	0,1242
Radiotherapy	184	0,4513
Dialysis	145	0,0208
Else	143	0,0259
A	172	0,0763
B	132	0,0072
C	140	0,0075
D	144	0,0109
E	124	0,0119
Normal Births	181	0,0654
Surgical Births	181	0,0761
Cesarean	144	0,0169
D_Inp_Ratio	120	0,044

4.4.2 Endogenously Determined Direction Vectors and Inpatient Satisfaction

Further insight can be gained by examining the correlation between the patient satisfaction and components of the distance vectors. Table 4.14 gives the correlation and corresponding t-value.

Table 4. 14: Correlation between endogenous vector components and inpatient satisfaction

Variable component of endogenous vector	Correlation with patient satisfaction	t-value
Beds	0,0423	0,591
Doctors	-0,0341	-0,476
Nurses	0,0089	0,125
Other HC professionals	0,0201	0,281
Administrative	0,0231	0,322
Support	-0,0832	-1,166
Inpatients	-0,2111	-3,015
Outpatients	-0,0960	-1,347
Chemotherapy	0,0262	0,365
Radiotherapy	-0,0349	-0,487
Dialysis	-0,1354	-1,909
Else	0,0388	0,542
A	0,0939	1,317
B	0,0556	0,778
C	-0,0303	-0,424
D	-0,1789	-2,539
E	-0,0586	-0,820
Normal Births	-0,0210	-0,293
Surgical Births	-0,0227	-0,317
Cesarean	-0,0718	-1,005
D_Inp_Ratio	0,1063	1,493

Although most of these correlations can be considered insignificant, some insight can be gained from them. If a variable's component is positively correlated with inpatient satisfaction scores, it means that DMU's with high inpatient satisfaction is expected to improve a lot in on that variable. Conversely, if there is a negative correlation, that means hospitals with high inpatient satisfaction tend to do already good and are expected to improve less when compared to other variables.

Among the inputs, support staff component of the direction vector has the highest (negative) correlation with inpatient satisfaction, suggesting that having too many support staff is correlated with high satisfaction levels. Considering the survey includes questions whether

the air conditioning was working, or general cleanliness/hygiene level was acceptable, this is hardly surprising.

Among the outputs, patient satisfaction is negatively correlated with minor surgeries components and positively correlated with major surgeries components. This indicates that hospitals that have a less complex surgical case mix is expected to have lower inpatient satisfaction. A possible explanation for this observation is hospitals with surgical teams that can routinely perform major surgeries provide better care and have higher inpatient satisfaction levels.

Both inpatient and outpatient components are negatively correlated with the survey scores. Implying that hospitals with high patient satisfaction levels tend to have little room to improve on these variables. This suggests that hospitals with higher patient satisfaction should be looking to improve other areas.

On the other hand, patient satisfaction is positively correlated with death to inpatient ratio component; in other words, hospitals with excess mortality tend to get low scores on the survey. This supports the argument that lack of quality in the services rendered can be observed on both mortality levels and inpatient satisfaction surveys.

5. CONCLUSIONS

330 general hospitals operated by the Ministry of Health were analyzed using a DEA model that includes a mortality-based variable as an undesirable output, performance measurements were conducted to provide insights for the policy makers. After calculating CRS, VRS-Strong and VRS-Weak efficiency scores; technical, scale and congestion components of the inefficiencies were determined.

Inclusion of the undesirable output in the DEA model in addition to the inpatient satisfaction surveys allows benchmarking of hospitals without disregard of quality of care.

Congested hospitals are the ones that should reduce death to inpatient ratio in addition to some form of input reduction and/or output expansion. It was demonstrated that such hospitals can be classified into two categories: capacity constrained hospitals that are working at the limit of strong disposability assumption and negative marginal productivity hospitals which can reduce mortality and input usage simultaneously.

Moreover, use of endogenous direction vectors that optimize for the shortest distance to the efficient frontier allows us to make policy recommendations on the aggregate level. It was demonstrated that the entire hospital system should aim more for output expansion than input reduction.

In the future, similar analysis can be performed on other types of hospitals. Moreover, depending on the availability of data, different components of inpatient satisfaction can be analyzed to determine their effects on efficiency.

REFERENCES

- [1] Türkiye Cumhuriyeti, "Anayasa," 1982. [Online]. Available: <https://www.anayasa.gov.tr/tr/mevzuat/anayasa/>. [Accessed 11 February 2020].
- [2] OECD, "Health spending (indicator)," 2020. [Online]. Available: doi: 10.1787/8643de7e-en. [Accessed 20 August 2022].
- [3] OECD, "Doctors (indicator)," 2020. [Online]. Available: doi: 10.1787/4355e1ec-en. [Accessed 11 February 2020].
- [4] OECD, "Nurses (indicator)," 2020. [Online]. Available: doi: 10.1787/283e64de-en. [Accessed 11 February 2020].
- [5] OECD, "Life expectancy at birth (indicator)," 2020. [Online]. Available: doi: 10.1787/27e0fc9d-en. [Accessed 20 August 2022].
- [6] World Bank, "Life expectancy at birth, total (years)," 2019. [Online]. Available: <https://data.worldbank.org/indicator/SP.DYN.LE00.IN?locations=XN-XT-XD-XM>. [Accessed 13 February 2020].
- [7] TUIK, "Temel İstatistikler," 2018. [Online]. Available: <http://www.tuik.gov.tr/UstMenu.do?metod=temelist>. [Accessed 13 February 2020].
- [8] Ministry of Health, "Health Statistics Yearbook," 2018. [Online]. Available: <https://dosyasb.saglik.gov.tr/Eklenti/36164,siy2018en2pdf.pdf?0>. [Accessed 13 February 2020].
- [9] Y. Chung, R. Fare and S. Grosskopf, "Productivity and Undesirable Outputs: A Directional Distance Function Approach," *Journal of Environmental Management*, vol. 51, no. 3, pp. 229-240, 1997.
- [10] E. Thanassoulis, M. C. Portela and O. Despic., "'Data envelopment analysis: the mathematical programming approach to efficiency analysis," in *The measurement of productive efficiency and productivity growth*, 2008, pp. 251-420.
- [11] C. J. L. Murray and David B. Evans, *Health Systems Performance Assessment: Debates, Methods and Empiricism*, Geneva: World Health Organization, 2003.
- [12] V. Burau and R. H. Blank, "Comparing health policy: An assesment of typologies of health systems," *Journal of Coparative Policy Analysis: Research and Practice*, vol. 8, no. 1, pp. 63-76, 2006.
- [13] C. Wendt, L. Frisina and H. Rothgang, "Healthcare System Types: A Conceptual Framework for Comparison," *Social Policy & Administration*, vol. 43, no. 1, pp. 70-90, 2009.
- [14] K. Böhm, A. Schmid, R. Götze, C. Landwehr and H. Rothgang, "Five types of OECD healthcare systems: Empirical results of a deductive classification," *Health Policy*, vol. 113, no. 3, pp. 258-269, 2013.
- [15] C. Wendt, "Changing Healthcare System Types," *Social Policy & Administration*, vol. 48, no. 7, pp. 864-882, 2014.
- [16] G. Backman, P. Hunt, R. Khosla, C. Jaramillo-Strouss, B. M. Fikre, C. Rumble, D. Pevalin, D. A. Páez, M. A. Pineda, A. Frisancho, D. Tarco, M. Motlagh, D. Farcasanu

- and C. Vladescu, "Health systems and the right to health: an assessment of 194 countries," *The Lancet*, vol. 372, no. 9655, pp. 2047-2085, 2008.
- [17] J. Gerring, S. C. Thacker, R. Enikolopov, J. Arévalo and M. Maguire, "Assessing health system performance: A model-based approach," *Social Science & Medicine*, vol. 93, pp. 21-28, 2013.
- [18] V. J. M. Cantor and K. L. Poh, "Integrated Analysis of Healthcare Efficiency: A Systematic Review," *Journal of Medical Systems*, vol. 42, no. 8, pp. 1-23, 2018.
- [19] M. S. Yildirim and S. Uner, "Equity in access to care in the era of health system reforms in Turkey," *Health Policy*, vol. 122, no. 6, pp. 645-651, 2018.
- [20] M. d. Looper and G. Lafortune, "Measuring Disparities in Health Status and in Access and Use of Health Care in OECD Countries," OECD Health Working Papers No. 43, <https://doi.org/10.1787/18152015>, 2009.
- [21] General Directory of Health Information Systems, "Health Statistics Yearbook 2019," Ministry of Health, Ankara, 2021.
- [22] World Bank, "Mortality Rate, Infant (per 1000 live births)," 2019. [Online]. Available: <https://data.worldbank.org/indicator/SP.DYN.IMRT.IN>. [Accessed 13 February 2020].
- [23] General Directory of Health Information Systems, Health Statistics Yearbook 2018, Ankara: Ministry of Health, 2019.
- [24] General Directorate of Health Research, Health Statistics Yearbook 2014, Ankara: Ministry of Health, 2015.
- [25] Haberturk, "Türkiye, yoğun bakım hasta yatağı sayısında dünyada lideri," 2 February 2018. [Online]. Available: <https://www.haberturk.com/turkiye-yogun-bakim-hasta-yatagi-sayisinda-dunyada-lideri-1820997>. [Accessed 18 August 2022].
- [26] İ. Şahin, Y. A. Özcan and H. Özgen, "Assessment of hospital efficiency under health," *Central European Journal of Operations Research*, vol. 19, no. 1, pp. 19-37, 2011.
- [27] R. Akdağ, Türkiye Sağlıkta Dönüşüm Programı, Ankara: T.C. Sağlık Bakanlığı, 2012.
- [28] World Health Organization, "Global Health Workforce Statistics," Geneva, 2018.
- [29] R. Atun, S. Aydın, S. Chakraborty, S. Sümer, M. Aran, I. Gürol, S. Nazlıoğlu, Ş. Özgülcü, Ü. Aydoğan, B. Ayar, U. Dilmen and R. Akdağ, "Universal health coverage in Turkey: enhancement of equity," *The Lancet*, vol. 382, no. 9886, pp. 65-99, 2013.
- [30] H. Fried, C. Lovell and S. Schmidt, "Efficiency and productivity," in *The Measurement of Productive Efficiency: Techniques and Applications*, Oxford, Oxford University Press, 2008.
- [31] W. H. Greene, "The Econometric Approach to Efficiency Analysis," in *The Measurement of Productive Efficiency and Productivity Growth*, Oxford, Oxford University Press, 2008.

- [32] E. Thanassoulisa, M. C. S. Portelab and O. Despića, "DEA – The Mathematical Programming Approach to Efficiency Analysis," in *The Measurement of Productive Efficiency and Productivity Growth*, Oxford, Oxford University Press, 2008.
- [33] M. J. Farrel, "The Measurement of Productive Efficiency," *Journal of the Royal Statistical Society*, vol. 120, no. 3, pp. 253-290, 1957.
- [34] A. Charnes, W. Cooper and E. Rhodes, "Measuring the efficiency of decision making units," *European Journal of Operational Research*, vol. 2, no. 6, pp. 429-444, 1978.
- [35] W. W. Cooper, L. M. Seiford and K. Tone, *Data Envelopment Analysis* (2nd Ed.), New York, NY: Springer Science+Business Media, LLC, 2007.
- [36] R. D. Banker, A. Charnes and W. W. Cooper., "Some models for estimating technical and scale inefficiencies in data envelopment analysis.," *Management science*, vol. 30, no. 9, p. 1078–1092, 1984.
- [37] R. W. Pittman, "Multilateral Productivity Comparisons with Undesirable Outputs," *The Economic Journal*, vol. 93, no. 372, pp. 883-891, 1983.
- [38] R. Fare, S. Grosskopf, C. A. K. Lovell and C. Pasurka, "Multilateral Productivity Comparisons When Some Outputs are Undesirable: A," *The Review of Economics and Statistics*, vol. 71, no. 1, pp. 90-98, 1989.
- [39] G. Halkos and K. N. Petrou, "Treating undesirable outputs in DEA: A critical review," *Economic Analysis and Policy*, no. 62, pp. 97-104, 2019.
- [40] Y. Chung, R. Fare and S. Grosskopf, "Productivity and undesirable outputs: a directional distance," *Journal of Environmental Management*, no. 51, pp. 229-240, 1997.
- [41] P. Zhou, B. Ang and H. Wang, "Energy and CO2 emission performance in electricity generation: A non-radial directional distance function approach," *European Journal of Operational Research*, vol. 221, no. 3, pp. 625-635, 2012.
- [42] W. Liu, W. Meng and D. Z. X.X. Li, "DEA models with undesirable inputs and outputs," *Annals of Operational Research*, vol. 173, p. 177–194, 2010.
- [43] Ş. Kavuncubaşı, *Hastanelerde göreceli verimlilik ölçümü: veri çevreleme analizinin uygulanması*, Ankara: Hacettepe Üniversitesi Sağlık Bilimleri Enstitüsü, 1995.
- [44] K. Ersoy, S. Kavuncubasi, Y. A. Ozcan and J. M. Harris II, "Technical efficiencies of Turkish hospitals: DEA approach," *Journal of Medical Systems*, vol. 21, no. 2, pp. 67-74, 1997.
- [45] E. Atilgan, "The technical efficiency of hospital inpatient care services: an application for Turkish public hospitals.," *Business and Economics Research Journal*, vol. 7, no. 2, p. 203 214, 2016.
- [46] B. Erus and O. Hatipoglu, "Physician payment schemes and physician productivity: analysis of Turkish healthcare reforms.," *Health Policy*, vol. 121, no. 5, pp. 553-557, 2017.
- [47] M. S. Yildiz, V. Heboyan and M. M. Khan., "Estimating technical efficiency of Turkish hospitals: implications for hospital reform initiatives.," *BMC health services research*, vol. 18, no. 401, 2018.

- [48] S. Mollahaliloglu, S. Kavuncubasi, F. Yilmaz, M. Z. Younis, F. Simsek, M. Kostak, S. Yildirim and E. Nwagwu, "Impact of health sector reforms on hospital productivity in Turkey: Malmquist index approach," *International Journal of Organization Theory & Behavior*, vol. 21, no. 2, pp. 72-84, 2018.
- [49] C. Yildirim, H. Kacak, S. Yildirim and S. Kavuncubasi, "Comprehensive Efficiency Assessment of Turkish Teaching Hospitals: Technical, Pure Technical and Scale Efficiencies with Data Envelopment Analysis," *Journal of Applied Business and Economics*, vol. 21, no. 3, 2019.
- [50] S. Cinaroglu, "Integrated k-means clustering with data envelopment analysis of public hospital efficiency.," *Health care management science*, vol. 1, no. 14, 2019.
- [51] M. Karahan, "Using Data Envelopment Analysis to Measure the Technical Efficiency of Public Hospitals in Turkey.," *e-Journal of Science & Technology*, vol. 19, no. 3, 2019.
- [52] C. Akkan, M. A. Karadayi, Y. Ekinci, Ülengin, U. N. F. and E. Karaosmanoğlu, "Efficiency analysis of emergency departments in metropolitan areas," *Socio-Economic Planning Sciences*, vol. 69, no. 100679, 2020.
- [53] P. C. S. A. S. Rowena Jacobs, *Measuring Efficiency in Health Care*, Cambridge University Press: New York, 2006.
- [54] M. R. C. David W. Baker, "Holding Providers Accountable for Health Care Outcomes," *Annals of Internal Medicine*, vol. 167, no. 4, pp. 418-423, 2017.
- [55] R. Fare, S. Grosskopf and D. Tyteca, "An activity analysis model of the environmental performance of firms- application to fossil-fuel-fired electric utilities," *Ecological Economics*, pp. 161-175, 1996.
- [56] R. Fare, S. Grosskopf and D. Margaritis, "Efficiency and Productivity: Malmquist and More," in *Measurement of Productive Efficiency and Productivity Growth*, Oxford University Press, 2008.
- [57] R. Fare, S. Grosskopf and G. Whittaker, "Directional output distance functions: endogenous directions based on exogenous normalization constraints," *Journal of Productivity Analysis*, vol. 40, p. 267–269, 2013.

APPENDIX A: DATASET

Hospital Name	Beds	Doctors	Nurses	SH P_DP	SWC	SOP	Satisfaction	Inpatients	Outpatients	Chemotherapy	Radiotherapy	Dialysis	Else	A	B	C	D	E	Normal Births	Surgical Births	Cesarean	D_Inp_Ratio
ADANA CEYHAN DEVLET HASTANESİ	176	68	155	32	45	244	0,86	11.887	759.000	0	0	4.038	0	70	766	1.977	1.687	3.174	0	1.175	0	0,003
ADANA ÇUKUROVA DEVLET HASTANESİ	600	157	483	106	287	518	0,76	26.668	894.035	3.884	0	2.216	14.326	1.202	5.571	8.949	8.305	5.779	0	0	0	0,0184
ADANA DEVLET HASTANESİ	311	133	312	80	114	473	0,73	20.371	910.718	0	0	0	21.841	606	3.116	5.574	5.033	7.583	0	0	0	0,009
ADANA KARAİSALI DEVLET HASTANESİ	25	16	45	2	15	14	0,82	548	71.038	0	0	0	2.225	0	0	0	0	4	16	4	0	0,0018
ADANA KOZAN DEVLET HASTANESİ	147	43	171	27	51	149	0,93	8.716	290.372	0	0	4.159	0	10	662	1.795	225	58	860	4	1.095	0,0007
ADANA TUFANBEYLİ DEVLET HASTANESİ	25	12	39	2	8	19	0,94	786	69.052	22	0	0	0	0	0	4	0	40	111	0	4	0,0013
AFYONKARAHİSAR DEVLET HASTANESİ	400	145	410	44	199	389	0,96	17.167	870.155	4	0	8.479	105	495	3.087	4.671	4.546	1.577	0	0	0	0,0249
AFYONKARAHİSAR DİNAR DEVLET HASTANESİ	100	27	109	20	17	86	0,99	3.527	170.552	0	0	2.224	0	0	43	326	213	535	214	0	206	0,0028
AFYONKARAHİSAR DR.HALİL İBRAHİM ÖZSOY BOLVADİN DEVLET HASTANESİ	98	24	84	9	35	65	0,95	4.902	221.520	0	0	0	0	30	360	582	271	318	381	14	267	0,0016
AFYONKARAHİSAR EMİRDAĞ DEVLET HASTANESİ	70	16	73	5	18	33	0,82	2.971	134.283	0	0	83	1.699	0	61	162	232	307	65	3	83	0,0027
AFYONKARAHİSAR SANDIKLI DEVLET HASTANESİ	140	35	112	22	39	96	0,96	5.182	299.327	90	0	159	0	2	321	556	946	1.803	359	10	148	0,0035
AĞRI DEVLET HASTANESİ	176	102	226	30	87	148	0,85	10.001	495.098	0	0	4.867	46.765	200	1.544	3.063	2.687	5.800	0	0	0	0,005
AĞRI DİYADİN DEVLET HASTANESİ	25	14	50	7	7	12	0,8	1.110	94.056	0	0	431	27	0	0	218	0	0	416	25	0	0,0018
AĞRI DR.YAŞAR ERYILMAZ DOĞUBEYAZIT DEVLET HASTANESİ	80	42	131	24	22	105	0,77	7.579	322.737	0	0	20	734	71	429	1.582	1.264	821	1.831	4	289	0,0005
AĞRI ELEŞKİRT DEVLET HASTANESİ	30	9	65	2	21	27	0,79	412	90.687	0	0	360	5.587	0	0	0	0	0	272	0	0	0,0073
AMASYA GÜMÜŞHACIKÖY DEVLET HASTANESİ	46	14	70	8	17	43	0,88	1.182	119.976	15	0	0	0	1	9	87	70	965	30	0	27	0,0237

AMASYA SABUNCUOĞLU ŞEREFEDDİN DEVLET HASTANESİ	4 2 6	96	401	42	20 4	34 4	0,88	19.8 84	740.2 65	0	0	5.4 13	54. 46 4	76	1. 86 8	3.2 10	2.2 71	1.8 25	1.126	65	1.28 0	0,014 4
ANKARA BEYPAZARI DEVLET HASTANESİ	6 3	32	129	22	37	86	0,83	3.47 9	285.5 92	0	0	62	0	11	20 2	46 8	56 2	28 5	375	6	79	0,007 8
ANKARA DR.HULUSİ ALATAŞ ELMADAĞ DEVLET HASTANESİ	7 5	29	60	17	43	40	0,98	2.19 2	174.0 62	0	0	0	0	25	16 4	34 9	51 8	30 9	27	0	8	0,013 2
ANKARA GÖLBAŞI HASVAK DEVLET HASTANESİ	7 5	55	81	20	16	14 2	0,95	2.94 1	265.4 24	0	0	0	2.7 73	20 0	42 0	78 3	1.0 88	1.1 97	269	6	166	0,005 8
ANKARA KAZAN HAMDİ ERİŞ DEVLET HASTANESİ	3 0	29	64	17	26	62	0,98	1.93 4	195.9 18	0	0	0	0	21	17 5	39 5	1.1 02	1.0 24	52	1	61	0,000 5
ANKARA KIZILCAHAMAM DEVLET HASTANESİ	5 5	26	75	24	30	50	0,96	2.04 2	135.2 23	0	0	1.2 33	1.6 00	34	14 6	43 1	43 4	55 8	18	6	31	0,004 4
ANKARA NALLIHAN DEVLET HASTANESİ	5 2	17	75	4	22	58	0,9	1.00 0	100.5 33	0	0	0	0	0	84	17 9	23 1	68 4	42	2	80	0,01
ANKARA POLATLI DUATEPE DEVLET HASTANESİ	2 7 6	79	206	51	74	32 6	0,96	15.6 01	521.4 59	49	0	66	0	98 6	1. 43 5	2.5 76	1.9 53	7.0 09	1.042	9	932	0,014
ANKARA ŞEREFLİKOÇHİSAR DEVLET HASTANESİ	5 0	21	77	4	51	38	0,95	3.23 9	144.4 35	0	0	7	0	18 2	54 9	38 6	1.3 57	5.0 40	176	1	54	0,002 5
ANTALYA ALANYA DEVLET HASTANESİ	2 2 5	70	205	45	49	18 1	0,86	12.8 03	494.1 51	27	0	8.2 40	18. 89 6	53	1. 02 5	3.0 95	3.0 19	11. 91 9	1.130	39	1.21 4	0,010 9
ANTALYA ATATÜRK DEVLET HASTANESİ	5 0 2	194	429	141	19 4	49 4	0,77	28.1 38	#### ##	0	0	3.5 94	28. 14 6	74 6	3. 85 4	4.9 78	1.4 40	5.8 49	1.672	17	2.24 0	0,017 1
ANTALYA DEMRE DEVLET HASTANESİ	4 0	10	53	17	13	24	0,96	810	83.45 8	0	0	1.2 83	1.1 70	0	14	33	28	11	4	0	5	0,003 7
ANTALYA ELMALI DEVLET HASTANESİ	5 0	19	55	14	18	37	0,82	1.38 2	135.2 48	0	0	38 8	5.0 24	0	34	28 4	38 1	19 2	81	0	122	0,001 4
ANTALYA FİNİKE DEVLET HASTANESİ	1 0 5	35	92	22	17	10 3	0,87	7.96 8	232.7 99	0	0	47 5	1.6 94	2	21 8	1.3 24	59 8	12 4	101	267	773	0,005 4
ANTALYA GAZİPAŞA DEVLET HASTANESİ	6 5	26	86	18	23	57	0,92	2.82 4	159.5 11	0	0	2.3 21	33 6	4	19 8	76 9	34 4	24 4	171	0	403	0,007 4
ANTALYA KAŞ DEVLET HASTANESİ	2 5	7	53	3	6	16	0,96	595	58.12 5	0	0	0	0	2	7	12 1	27 0	51 9	78	0	74	0,026 9
ANTALYA KEMER DEVLET HASTANESİ	2 5	16	53	17	11	54	0,91	1.01 4	129.9 59	0	0	0	3.6 47	0	39	23 9	25 6	2.8 48	43	33	56	0,005 9
ANTALYA KORKUTELİ DEVLET HASTANESİ	6 0	35	79	20	26	65	0,84	3.18 6	197.2 20	0	0	97 3	1.8 26	61	38 2	71 5	64 5	82 0	281	20	317	0,000 6
ANTALYA KUMLUCA DEVLET HASTANESİ	1 0 0	28	93	22	20	80	0,89	5.48 4	229.6 76	0	0	2.8 92	13. 34 3	8	36 4	81 9	62 7	1.2 01	408	14	309	0,001 1
ANTALYA MANAVGAT DEVLET HASTANESİ	1 7 9	75	208	33	45	19 3	0,82	13.6 86	655.1 74	0	0	5.9 08	17. 42 5	98	99 1	3.6 28	1.4 89	1.7 75	920	0	1.78 5	0,008 7
ANTALYA SERİK DEVLET HASTANESİ	1 0 0	54	161	26	33	14 2	0,9	10.0 46	424.4 12	0	0	0	70 3	78	1. 06 4	3.0 89	2.2 06	94 2	430	6	618	0,006 3

ARTVİN ARHAVİ DEVLET HASTANESİ	54	11	59	7	47	24	0,92	420	113.237	0	0	0	646	0	1	4	86	1.071	19	0	1	0,0595
ARTVİN BORÇKA DEVLET HASTANESİ	130	15	72	9	53	40	0,91	1.448	108.693	0	0	0	0	0	34	202	197	3.346	83	0	87	0,0035
ARTVİN DEVLET HASTANESİ	204	67	156	19	125	95	0,9	9.638	307.632	0	0	0	0	57	950	1.590	1.050	5.530	317	6	498	0,0094
ARTVİN HOPA DEVLET HASTANESİ	50	20	78	9	33	26	0,98	2.304	180.412	0	0	2.844	6.906	4	34	131	338	100	63	0	35	0,0069
ARTVİN ŞAŞAT DEVLET HASTANESİ	50	12	84	9	48	7	0,98	1.086	88.979	0	0	2.321	0	2	67	88	57	880	14	0	0	0,0111
ARTVİN YUSUFELİ DEVLET HASTANESİ	50	18	66	11	28	11	0,97	993	56.722	0	0	0	0	3	114	118	88	339	44	0	13	0,0242
AYDIN ATATÜRK DEVLET HASTANESİ	295	97	318	46	116	324	0,87	18.587	695.391	294	0	2.755	129	180	2.174	1.963	3.992	3.447	0	0	0	0,0192
AYDIN ÇİNE DEVLET HASTANESİ	64	25	73	12	18	64	0,97	4.797	179.303	0	0	0	0	2	409	442	605	968	77	2	72	0,0019
AYDIN DEVLET HASTANESİ	646	173	508	84	120	631	0,81	32.777	809.398	0	0	0	30.908	655	3.815	6.747	3.397	10.389	3.394	106	1.392	0,0187
AYDIN DİDİM DEVLET HASTANESİ	50	20	66	25	19	64	0,96	2.126	195.045	0	0	2.397	8.284	12	66	317	483	786	221	2	115	0,0085
AYDIN GERMENCİK DEVLET HASTANESİ	25	15	34	16	10	26	0,92	920	96.916	0	0	0	1.492	0	11	104	217	572	0	0	0	0,0011
AYDIN KUŞADASI DEVLET HASTANESİ	65	43	89	23	14	93	0,87	3.733	260.009	0	0	1.293	174	44	242	886	1.307	811	229	0	106	0,0188
AYDIN NAZİLLİ DEVLET HASTANESİ	405	120	281	54	121	460	0,86	19.249	851.849	336	0	295	1.225	325	1.517	2.547	1.397	4.923	1.101	26	1.274	0,0303
AYDIN SÖKE FEHİME FAİK KOCAGÖZ DEVLET HASTANESİ	245	74	222	35	33	246	0,89	12.229	483.704	0	0	0	0	27	867	1.050	582	1.435	578	11	305	0,0146
BALIKESİR ATATÜRK DEVLET HASTANESİ	600	97	362	47	143	319	0,9	19447	624780	394	0	4616	21.421	222	2147	4152	4259	8690	695	0	1414	0,0216
BALIKESİR AYVALIK DEVLET HASTANESİ	102	43	133	28	24	115	0,85	4822	275774	0	0	379	0	3	131	718	210	978	337	3	230	0,0114
BALIKESİR BIGADIÇ DEVLET HASTANESİ	44	17	57	14	15	37	0,96	1738	199821	0	0	2779	4.543	36	30	284	332	285	4	0	1	0,0109
BALIKESİR BURHANIYE DEVLET HASTANESİ	158	35	119	20	38	91	0,93	7020	253497	0	0	4115	0	145	156	643	317	315	272	14	279	0,0134
BALIKESİR DEVLET HASTANESİ	510	118	445	60	86	411	0,93	28958	875008	1072	3838	8887	9.650	206	2515	4993	3995	3568	1240	33	2141	0,0217
BALIKESİR DURSUNBEY DEVLET HASTANESİ	62	17	59	6	33	29	0,86	1305	87531	0	0	4	5.073	2	86	260	148	408	62	0	6	0,0077

BALIKESİR EDREMİT DEVLET HASTANESİ	202	71	247	31	96	234	0,95	13317	570996	0	0	1459	8.132	81	1532	3285	2576	1574	655	0	1142	0,0231
BALIKESİR ERDEK NEYYİRE SITKI DEVLET HASTANESİ	25	12	49	9	11	33	0,9	165	106356	0	0	0	0	0	0	0	0	0	1	0	0	0,0061
BALIKESİR GÖNEN DEVLET HASTANESİ	97	33	101	24	17	111	0,82	5348	318404	0	0	3813	2.880	149	358	781	684	195	213	8	316	0,0509
BALIKESİR HAVRAN DEVLET HASTANESİ	28	10	27	3	10	19	0,99	856	87589	0	0	0	0	0	0	0	0	0	0	0	0	0,0386
BALIKESİR İVRİNDİ DEVLET HASTANESİ	36	12	37	4	6	23	0,97	1167	70538	0	0	796	0	0	0	0	0	0	0	0	0	0,006
BALIKESİR MANYAS DEVLET HASTANESİ	56	12	41	5	6	53	0,95	1641	85397	0	0	0	1	0	34	74	330	173	8	0	7	0,0055
BALIKESİR SINDIRGI DEVLET HASTANESİ	75	13	41	5	22	35	0,84	1651	106455	0	0	2165	4.211	3	179	278	200	114	32	2	75	0,0085
BALIKESİR SUSURLUK DEVLET HASTANESİ	66	15	65	18	12	36	0,91	1199	143872	0	0	0	5.697	1	9	170	303	103	4	0	17	0,0058
BARTIN DEVLET HASTANESİ	300	71	210	31	79	273	0,84	10.165	459.236	267	0	0	2.698	492	1.753	2.088	2.179	1.562	0	0	0	0,0409
BATMAN BÖLGE DEVLET HASTANESİ	407	101	262	14	122	434	0,97	12.286	560.163	269	0	1.750	1.488	384	2.966	4.258	8.843	8.876	0	0	0	0,0059
BİLECİK BOZÜYÜK DEVLET HASTANESİ	120	50	141	21	51	92	0,86	8.072	236.215	0	0	1.691	0	18	406	2.772	1.663	1.885	343	3	350	0,0043
BİLECİK DEVLET HASTANESİ	128	60	167	18	68	138	0,82	6.744	285.427	0	0	6.225	9.380	31	841	1.741	1.758	8.220	297	5	446	0,016
BİNGÖL DEVLET HASTANESİ	325	75	245	30	192	217	0,87	14.380	458.841	34	0	168	19.357	84	1.495	2.994	3.419	610	0	0	0	0,0082
BİTLİS AHLAT DEVLET HASTANESİ	56	14	68	10	32	32	0,76	1.462	106.565	0	0	980	1.068	0	1	109	2	72	98	77	60	0,0007
BİTLİS DEVLET HASTANESİ	126	68	149	32	62	127	0,77	13.634	339.475	0	0	14	5.431	202	1.350	2.179	2.883	2.785	410	516	371	0,0167
BİTLİS TATVAN DEVLET HASTANESİ	279	58	208	27	118	165	0,91	21.713	485.727	0	0	0	0	196	1.411	1.029	0	0	1.276	476	1.102	0,003
BOLU GEREDİ DEVLET HASTANESİ	100	19	64	10	35	84	0,89	2.783	126.188	0	0	0	1.016	9	32	173	235	79	25	53	10	0,0014
BOLU İZZET BAYSAL DEVLET HASTANESİ	404	95	300	53	120	363	0,81	11.055	455.543	218	0	0	26.528	1.237	3.234	5.089	9.031	7.842	0	0	0	0,0294
BURDUR BUCAK DEVLET HASTANESİ	235	46	170	31	70	169	0,85	13.416	364.420	0	0	6.197	0	109	808	1.890	2.297	1.031	436	0	770	0,0122

BURDUR DEVLET HASTANESİ	3 4 9	70	245	22	97	23 1	0,8	15.1 29	663.0 14	66	0	5.6 13	7.3 65	41 4	1. 30 8	2.0 82	2.1 85	8.8 31	531	0	808	0,012 2
BURSA ÇEKİRGE DEVLET HASTANESİ	5 2 5	200	532	201	23 0	53 2	0,83	36.6 38	995. 241	0	0	9.6 88	17. 59 0	1. 28 1	4. 35 3	8. 07 5	6. 96 5	4.7 64	1.908	9	2.2 44	0,022 8
BURSA DEVLET HASTANESİ	8 0 8	239	643	85	93	71 4	0,81	39.4 85	##### ##	0	0	7.8 14	0	2. 34 2	5. 14 7	5.9 74	6.1 47	3.1 73	0	0	0	0,033 4
BURSA GEMLİK MUAMMER AĞIM DEVLET HASTANESİ	1 2 8	53	165	25	72	17 8	0,93	7.54 8	393.4 79	0	0	66 5	46 9	63	46 3	2.1 87	1.2 29	40 3	494	2	601	0,010 7
BURSA İNEGÖL DEVLET HASTANESİ	3 0 8	79	225	40	86	28 1	0,76	17.1 22	641.4 97	0	0	26 1	0	21 0	1. 60 7	3.0 70	1.8 88	1.8 72	1.715	67	1.28 7	0,012 6
BURSA İZNİK DEVLET HASTANESİ	9 2	23	60	5	17	57	0,92	3.64 5	137.1 24	0	0	0	0	19 2	31 9	47 7	18 4	16 4	170	2	29	0,001 1
BURSA KARACABEY DEVLET HASTANESİ	1 5 1	43	124	10	38	12 7	0,99	4.63 8	261.8 83	0	0	0	0	0	51 3	48 8	22 1	31 2	274	8	147	0,019
BURSA M.KEMALPAŞA DEVLET HASTANESİ	1 7 9	48	163	40	40	12 5	0,99	7.02 0	462. 073	0	0	53 5	1.1 68	0	35 6	81 2	57 7	22 0	424	269	411	0,020 5
BURSA MUDANYA ŞAZİYE RÜŞTÜ DEVLET HASTANESİ	4 5	25	86	21	30	60	0,96	2.89 3	200.4 26	2.927	0	0	45 0	60	49 1	40 6	1.1 26	38 5	72	0	73	0,004 8
BURSA ORHANGAZİ DEVLET HASTANESİ	8 0	25	100	10	41	71	0,88	2.67 3	213.8 37	2.694	0	0	52 2	3	18 7	47 2	28 4	15 5	130	42	175	0,007 1
BURSA ŞEVKET YILMAZ DEVLET HASTANESİ	5 0 6	151	522	43	80	60 9	0,96	23.1 85	988. 737	0	0	3.9 22	0	46 2	1. 52 0	3. 58 1	4. 72 5	4.5 78	1.609	6	1.2 69	0,018 2
BURSA YENİŞEHİR DEVLET HASTANESİ	6 2	20	80	10	18	85	0,94	3.68 9	185. 468	0	0	0	0	0	21 7	53 2	68 5	48 6	200	0	184	0,007 6
ÇANAKKALE AYVACIK DEVLET HASTANESİ	2 5	9	32	2	9	15	0,99	789	60.77 6	0	0	0	13 4	0	17	0	0	2	0	0	0	0,017 7
ÇANAKKALE BAYRAMIÇ DEVLET HASTANESİ	2 5	12	45	5	11	37	0,91	695	141.0 86	0	0	0	0	0	10	36	23	19	3	12	5	0,015 8
ÇANAKKALE BIGA DEVLET HASTANESİ	1 3 2	37	115	33	35	12 2	0,85	5.68 7	261.2 36	0	0	0	2.8 89	46	33 0	80 5	64 5	1.1 21	232	21	419	0,006 5
ÇANAKKALE ÇAN DEVLET HASTANESİ	1 1 5	23	96	24	36	57	0,93	3.11 1	189.9 90	0	0	24 0	0	0	74	39 4	18 3	38	196	0	225	0,002 6
ÇANAKKALE DEVLET HASTANESİ	5 0 0	152	436	70	12 9	34 9	0,89	25.0 86	803.6 91	0	0	21 1	13. 78 3	35 3	3. 81 1	5.2 83	2.6 52	18. 45 4	778	11	1.15 8	0,030 9
ÇANAKKALE EZİNE DEVLET HASTANESİ	4 5	17	70	8	17	44	0,91	2.19 7	98.45 9	0	0	0	0	0	28 9	39 4	25 2	20 4	85	204	90	0,006 4
ÇANAKKALE GELİBOLU DEVLET HASTANESİ	5 5	20	75	6	10	38	0,96	1.87 0	136.0 42	0	0	0	3.7 32	0	7	40 4	39 2	69 1	118	0	96	0,004 3

ÇANKIRI ÇERKEŞ DEVLET HASTANESİ	25	8	42	4	11	10	0,97	474	57.869	0	0	0	0	0	0	0	0	0	0	0	0	0,0021
ÇANKIRI DEVLET HASTANESİ	243	83	227	40	127	178	0,88	12.667	473.378	84	0	8.355	20.422	360	1.724	2.607	2.057	1.244	591	0	553	0,0137
ÇORUM ALACA DEVLET HASTANESİ	50	15	39	8	25	47	0,96	3.302	129.019	0	0	1.241	0	0	169	119	407	378	198	1	25	0,0006
ÇORUM BAYAT DEVLET HASTANESİ	34	10	36	4	18	19	0,98	1.335	44.271	0	0	0	0	0	0	148	24	3	67	0	0	0,003
ÇORUM DEVLET HASTANESİ	811	150	526	93	293	480	0,8	28.983	954.052	713	0	5.225	1	986	3.350	6.252	3.926	1.853	1.964	9	2.031	0,0207
ÇORUM İSKİLİP DEVLET HASTANESİ	100	19	81	20	25	73	0,99	2.770	152.493	20	0	3.110	0	0	128	421	260	107	236	5	179	0,0032
ÇORUM KARGI DEVLET HASTANESİ	25	7	36	4	7	7	0,88	51	41.902	0	0	1.178	3	0	0	0	0	0	0	0	0	0,0196
ÇORUM MECİTÖZÜ DEVLET HASTANESİ	33	8	40	5	10	29	0,65	522	78.078	0	0	0	0	0	0	0	0	0	3	4	0	0,0115
ÇORUM OSMANCIK DEVLET HASTANESİ	122	17	74	4	51	73	0,97	2.153	158.848	0	0	3.807	435	20	38	331	419	2.399	203	0	134	0,0042
ÇORUM SUNGURLU DEVLET HASTANESİ	110	31	94	25	52	108	0,93	4.860	207.672	0	0	1.920	0	94	519	785	1.272	2.487	236	0	189	0,0019
DENİZLİ ACIPAYAM DEVLET HASTANESİ	50	22	82	8	19	54	0,89	4.501	154.263	0	0	4.720	0	7	94	696	92	117	453	0	427	0,0007
DENİZLİ BULDAN ARIŞ CERİT DEVLET HASTANESİ	28	13	62	6	11	33	0,96	985	69.515	0	0	0	3.052	0	18	87	85	211	59	3	49	0,001
DENİZLİ ÇARDAK DEVLET HASTANESİ	25	7	24	2	8	10	0,89	483	31.520	0	0	0	350	1	76	52	84	183	3	0	0	0,0041
DENİZLİ ÇİVRİL DEVLET HASTANESİ	60	22	98	15	33	60	0,91	1.620	170.970	0	0	6.587	0	4	32	277	197	215	235	0	184	0,0025
DENİZLİ DEVLET HASTANESİ	735	222	664	74	104	596	0,88	46.379	#####	4.099	0	14.068	13.0920	400	5.488	9.451	7.728	3.480	2.207	85	1.719	0,0245
DENİZLİ HONAZ DEVLET HASTANESİ	30	12	41	4	9	17	0,97	587	68.612	0	0	0	0	0	1	17	10	233	4	1	2	0,0017
DENİZLİ KALE DEVLET HASTANESİ	46	8	30	4	11	18	0,98	294	63.488	0	0	0	0	0	0	0	0	0	11	0	0	0,0068
DENİZLİ SARAYKÖY DEVLET HASTANESİ	35	18	67	5	22	35	0,9	906	111.719	0	0	0	1.104	4	93	152	98	162	48	0	36	0,0011
DENİZLİ SERVERGAZİ DEVLET HASTANESİ	304	103	316	38	98	255	0,79	21.272	567.218	0	0	0	11.393	1.033	3.284	3.608	2.118	1.854	964	166	471	0,0155
DENİZLİ TAVAS DEVLET HASTANESİ	53	17	72	11	18	58	0,9	4.731	134.966	0	0	488	0	9	242	526	307	1.269	241	0	237	0,0017
DIYARBAKIR BİSMİL DEVLET HASTANESİ	61	43	127	21	41	113	0,75	5.749	350.085	0	0	22	40	5	225	1.055	1.495	444	944	443	535	0,0031

DIYARBAKIR ÇERMİK DEVLET HASTANESİ	50	20	69	7	15	45	0,74	2.151	163.668	0	0	0	0	0	67	265	391	1.128	384	0	0	0,0009
DÜZCE AKÇAKOCA DEVLET HASTANESİ	50	23	54	19	15	37	0,92	949	126.344	0	0	29	0	0	10	94	311	1.969	12	7	34	0,0042
DÜZCE ATATÜRK DEVLET HASTANESİ	309	125	272	47	96	326	0,9	14.421	594.349	0	0	75	0	257	2.031	4.525	3.179	4.363	901	8	1.468	0,008
EDİRNE DEVLET HASTANESİ	422	142	343	33	77	366	0,94	18.740	946.854	0	0	5.964	2.842	326	2.249	3.461	2.013	1.966	317	1	581	0,0072
EDİRNE İPSALA DEVLET HASTANESİ	31	8	22	4	6	18	0,98	1.430	75.325	0	0	0	2.461	0	31	116	28	26	27	0	48	0,0056
EDİRNE KEŞAN DEVLET HASTANESİ	175	41	155	20	37	99	0,94	9.234	308.174	0	0	1.682	0	92	725	1.330	1.365	796	318	3	617	0,0138
EDİRNE UZUNKÖPRÜ DEVLET HASTANESİ	200	44	116	19	22	100	0,92	8.426	327.063	0	0	472	0	105	318	1.174	498	880	275	10	227	0,007
ELAZIĞ HARPUT DEVLET HASTANESİ	317	106	261	25	217	222	0,96	17.306	514.940	0	0	3.789	1.101	118	1.549	2.398	2.322	2.320	304	228	354	0,0043
ELAZIĞ KOVANCILAR DEVLET HASTANESİ	40	10	62	18	27	26	0,94	1.555	123.801	0	0	844	2.656	0	4	66	109	594	142	49	4	0,0006
ERZİNCAN DEVLET HASTANESİ	400	98	406	48	226	403	0,96	16.019	780.419	361	0	6.480	1.957	86	1.238	3.506	1.983	1.510	794	327	1.401	0,0142
ERZURUM HORASAN DEVLET HASTANESİ	54	20	76	19	11	47	0,94	2.888	135.143	0	0	787	5.520	0	69	128	252	177	292	50	46	0,0028
ERZURUM OLTU DEVLET HASTANESİ	100	26	102	17	27	102	0,91	4.098	189.845	0	0	2.929	0	4	235	452	485	3.108	244	106	126	0,0027
ESKİŞEHİR ÇİFTELER DEVLET HASTANESİ	45	12	45	2	11	29	0,93	748	78.961	0	0	2.320	4.978	0	3	4	22	10	13	0	0	0,0027
ESKİŞEHİR DEVLET HASTANESİ	540	140	471	69	77	455	0,95	24.946	668.568	378	0	997	0	1.250	3.752	4.829	7.800	9.433	0	0	0	0,0203
ESKİŞEHİR SIVRIHİSAR DEVLET HASTANESİ	43	11	46	4	11	27	0,98	1.708	77.955	0	0	250	0	25	117	583	482	265	9	0	0	0,0117
ESKİŞEHİR YUNUS EMRE DEVLET HASTANESİ	618	152	485	32	164	420	0,82	26.583	727.147	950	0	9.154	0	933	5.091	4.392	7.133	8.312	0	0	0	0,019
GİRESUN BULANCAK DEVLET HASTANESİ	79	27	102	15	31	66	0,79	2.898	180.937	0	0	139	95	191	172	337	412	1.463	66	61	53	0,0072
GİRESUN DERELİ DEVLET HASTANESİ	25	7	40	6	21	18	0,99	438	53.641	0	0	0	0	0	0	0	0	611	0	0	0	0,0023
GİRESUN PROF. DR. A. İLHAN ÖZDEMİR DEVLET HASTANESİ	420	105	419	43	136	390	0,86	16.031	574.747	680	0	7.509	922	167	1.479	2.477	1.237	1.634	0	0	0	0,0248
GİRESUN Ş.KARAHİSAR DEVLET HASTANESİ	105	17	68	4	14	36	0,98	1.168	97.000	0	0	178	0	4	44	125	130	30	10	27	33	0,0197

GİRESUN TİREBOLU DEVLET HASTANESİ	8 0	17	90	10	29	46	0,95	2.77 6	158.9 47	0	0	1.3 87	0	0	10	27 6	94	1.5 54	156	0	107	0,007 6
GÜMÜŞHANE DEVLET HASTANESİ	2 0 8	54	165	32	10 0	12 4	0,96	10.2 71	317.1 22	0	0	12 3	21	11 1	1. 18 7	1.5 88	1.0 76	85 5	328	366	399	0,009 8
GÜMÜŞHANE KELKİT DEVLET HASTANESİ	7 7	16	67	8	29	54	0,94	2.41 2	116.8 90	0	0	0	0	5	11 6	41 6	10 9	17	76	83	147	0,000 8
HAKKARİ DEVLET HASTANESİ	1 6 0	65	187	5	10 4	16 7	1	13.7 05	360.5 58	0	0	24 8	2.3 27	83	1. 01 4	1.8 16	1.2 37	60 0	656	385	439	0,003
HAKKARİ ŞEMDİNLİ DEVLET HASTANESİ	4 3	12	56	4	21	44	1	3.17 4	104.0 55	0	0	48 9	4.8 99	0	46	14 1	43 3	54 6	199	148	39	0,006 9
HAKKARİ YÜKSEKOVA DEVLET HASTANESİ	1 5 0	58	169	14	73	13 6	1	10.1 60	323.9 54	0	0	35 2	1.4 79	39	39 5	1.8 12	1.0 64	1.1 08	1.188	428	541	0,010 4
İĞDIR DEVLET HASTANESİ	2 2 0	92	212	28	68	19 9	0,9	17.7 79	687.1 46	0	0	76 6	2.6 81	11 0	97 4	3.6 42	1.2 82	1.5 27	2.456	23	1.72 2	0,001 7
İĞDIR TUZLUCA DEVLET HASTANESİ	2 5	9	29	3	8	17	0,9	32	46.55 5	0	0	0	0	0	0	0	3	0	2	0	0	0,093 8
İSTANBUL BAYRAMPAŞA DEVLET HASTANESİ	1 5 0	66	123	30	36	14 5	0,82	5.16 8	563.1 65	0	0	0	0	10 6	86 3	1.6 69	1.4 94	1.0 98	21	0	37	0,001 5
İSTANBUL BÜYÜKÇEKMECE DEVLET HASTANESİ	5 0	41	90	5	22	81	0,79	1.95 7	299.7 76	0	0	0	1.0 08	2	32 9	66 4	27 8	75 1	32	3	27	0,003 6
İSTANBUL ÇATALCA İLYAS ÇOKAY DEVLET HASTANESİ	5 0	30	58	5	18	70	0,86	1.77 2	218.3 44	0	0	0	74 9	7	26 2	48 6	18 7	41	111	0	169	0,004 5
İSTANBUL ESENYURT DEVLET HASTANESİ	2 1 0	69	141	35	31	23 0	0,96	7.77 7	726.9 46	0	0	13 0	2.5 73	85	1. 15 8	1.3 11	74 4	49 1	0	0	0	0,000 8
İSTANBUL EYÜP DEVLET HASTANESİ	8 0	85	121	22	14 6	14 4	0,96	4.48 3	780.7 50	0	0	0	45. 47 6	41	65 6	1.6 22	58 2	13 9	20	1	12	0,001 8
İSTANBUL KARTAL YAVUZ SELİM DEVLET HASTANESİ	3 6 7	147	329	82	20 0	49 2	0,82	12.1 53	#### ##	0	0	0	7.5 34	93 2	3. 59 3	3.1 30	1.2 06	69 2	1	0	0	0,022 5
İSTANBUL LÜTFİYE NURİ BURAT DEVLET HASTANESİ	3 9	39	91	5	28	10 7	0,87	2.71 3	444.8 25	0	0	0	11. 42 3	0	17 7	65 9	40 0	1.0 13	3	3	0	0,000 7
İSTANBUL PAŞABAĞÇE DEVLET HASTANESİ	3 5 0	141	307	55	19 0	35 8	0,7	9.82 1	918.6 79	1.171	0	79 4	52. 01 8	77 8	1. 84 6	3.6 52	2.1 41	1.3 19	223	3	315	0,007 7
İSTANBUL PENDİK DEVLET HASTANESİ	1 1 8	110	209	34	80	18 5	0,75	6.47 4	931.4 91	0	0	5.4 08	49 8	39 1	1. 28 9	2.5 84	1.5 52	1.4 69	773	3	328	0,003 2
İSTANBUL SARIYER İSMAİL AKGÜN DEVLET HASTANESİ	5 1	37	70	16	20	79	0,86	3.49 4	324.6 49	0	0	0	0	12	16 9	92 2	1.1 86	64 2	16	0	65	0,003 1
İSTANBUL SARIYER İSTİNYE DEVLET HASTANESİ	1 3 4	79	150	20	47	16 7	0,87	5.93 8	513.1 05	0	0	17 1	67 9	95 1	70 9	1.2 35	1.4 97	1.0 18	126	15	266	0,007 1

İSTANBUL ÜSKÜDAR DEVLET HASTANESİ	3 2 8	136	189	74	11 6	29 9	0,9	10.5 16	751.9 45	0	0	3.0 28	0	13 8	2. 11 4	2.3 88	3.1 39	3.8 58	0	0	1	0,001
İZMİR ALİAĞA DEVLET HASTANESİ	7 4	41	98	17	53	11 1	0,85	3.53 8	284.9 27	0	0	12 7	25 8	72	48 7	89 6	1.5 70	2.2 11	122	0	100	0,001 1
İZMİR ALSANCAK NEVVAR SALİH İŞGÖREN DEVLET HASTANESİ	2 0 2	148	193	53	55	23 2	0,86	8.15 8	693.3 86	0	0	93 7	25 7	50 8	1. 54 7	2.4 48	6.5 59	6.3 52	105	1	183	0,006
İZMİR BAYINDIR DEVLET HASTANESİ	6 1	28	50	3	11	54	0,97	2.79 6	160.6 23	0	0	0	0	28	12 3	21 4	21 0	29 1	29	0	26	0,013 6
İZMİR BUCA SEYFİ DEMİRSOY DEVLET HASTANESİ	4 0 6	168	357	59	12 0	10 00 0	0,8	19.1 38	893.6 66	0	0	0	73 0	1. 25 6	3. 83 6	4.8 77	8.0 10	19. 92 6	806	7	399	0,016 3
İZMİR ÇİĞLİ DEVLET HASTANESİ	3 0	34	52	7	26	71	0,97	1.98 5	226.3 76	0	0	0	0	43	35 3	37 4	50 2	1.0 21	0	0	0	0,000 5
İZMİR DR.FARUK İLKER BERGAMA DEVLET HASTANESİ	1 3 9	64	157	20	36	15 7	0,78	7.35 4	309.4 74	49	0	3.9 89	0	47	41 7	1.1 00	86 2	27 8	449	20	620	0,008 2
İZMİR FOÇA DEVLET HASTANESİ	3 0	20	50	4	11	24	0,84	478	71.81 0	0	0	36	3.0 13	0	12 2	19 0	41 5	72 6	0	0	0	0,008 4
İZMİR KARŞIYAKA DEVLET HASTANESİ	2 6 7	147	296	64	11 4	39 9	0,82	13.4 77	818.6 09	0	0	0	0	21 1	1. 89 1	2.5 36	3.0 98	6.4 55	172	11	150	0,025 9
İZMİR KIRAZ DEVLET HASTANESİ	3 0	12	34	3	10	24	0,87	1.54 1	79.31 7	0	0	0	0	0	58	80	55	94	11	0	22	0,004 5
İZMİR M.ENVER ŞENERDEM TORBALI DEVLET HASTANESİ	1 0 0	57	98	18	39	11 5	0,96	7.83 4	399.7 08	0	0	1.9 31	0	22	52 6	1.3 33	36 4	95 9	781	16	570	0,002 2
İZMİR MENEMEN DEVLET HASTANESİ	1 2 2	68	120	33	33	18 5	0,91	15.0 58	589.1 58	0	0	0	2.5 65	12	1. 52 2	2.4 18	1.3 76	2.7 84	867	9	479	0,003 9
İZMİR NEJAT HEPKON SEFERİHİSAR DEVLET HASTANESİ	5 0	26	68	18	24	54	0,95	2.65 7	185.1 20	0	0	0	66 4	13	37 5	92 7	1.1 41	1.0 26	24	0	82	0,001 5
İZMİR ÖDEMİŞ DEVLET HASTANESİ	2 6 5	72	182	27	51	18 2	0,89	11.5 61	538.9 09	0	0	0	0	89	1. 35 1	2.6 89	1.4 46	3.5 18	765	1	1.31 6	0,011 9
İZMİR SELÇUK DEVLET HASTANESİ	5 0	31	72	20	22	48	0,91	2.34 7	185.0 48	0	0	2.2 90	12 1	2	18 4	26 0	45 6	28 5	42	0	12	0,003 8
İZMİR TİRE DR.ERTUĞRUL AKER DEVLET HASTANESİ	1 8 0	55	133	17	33	20 6	0,91	8.96 7	428.0 17	0	0	9.4 57	11. 72 6	14 6	1. 25 7	1.7 12	2.6 61	7.3 15	732	13	481	0,012
İZMİR URLA DEVLET HASTANESİ	1 2 4	60	125	29	23	12 8	0,83	3.39 4	219.6 30	0	0	99	83	39 7	54 0	43 9	1.9 13	8.9 60	43	3	50	0,002 9
KAHRAMANMARAŞ AFŞİN DEVLET HASTANESİ	1 0 1	40	112	13	31	12 9	0,95	8.88 8	298.2 64	0	0	17 9	0	31	43 6	85 5	1.5 93	1.2 64	563	0	379	0,001 9
KAHRAMANMARAŞ ANDIRIN DEVLET HASTANESİ	2 5	16	68	8	9	29	0,92	1.05 9	74.88 5	0	0	0	2.5 21	0	6	14	33 2	37 3	24	0	0	0,000 9

KAHRAMANMARAŞ DEVLET HASTANESİ	5 1 5	145	496	22	11 6	39 7	0,99	22.1 27	749.3 71	0	0	0	14. 96 2	94 8	4. 57 5	5.1 10	5.6 30	4.8 28	0	0	0	0,019 9
KAHRAMANMARAŞ DR.SÜREYYA ADANALI GÖKSUN DEVLET HASTANESİ	5 3	19	80	18	60	39	0,95	3.08 8	188.4 74	0	0	2.0 30	43	0	56	39 5	23 2	33 0	372	0	194	0,011 7
KAHRAMANMARAŞ ELBİSTAN DEVLET HASTANESİ	2 3 4	67	186	22	71	19 3	0,93	14.8 27	546.1 41	0	0	38 4	75 5	13 1	80 0	2.2 37	1.3 66	1.2 86	2.170	1	923	0,005 2
KAHRAMANMARAŞ PAZARCIK DEVLET HASTANESİ	1 0 0	29	92	6	13	92	0,95	7.28 7	200.5 92	0	0	0	0	1	24 9	52 1	75 3	63 6	685	6	214	0,003 3
KAHRAMANMARAŞ YENİŞEHİR DEVLET HASTANESİ	1 5 0	59	153	23	85	14 7	0,9	7.78 0	519.6 51	0	0	0	1.6 42	28	1. 86 5	2.0 72	1.9 65	2.3 29	0	0	0	0,004 5
KARABÜK DEVLET HASTANESİ	4 2 0	93	301	33	18 0	34 9	0,86	16.6 23	733.4 87	371	0	12. 07 1	19. 66 9	12 2	1. 98 7	2.1 72	2.5 37	6.0 70	0	0	0	0,026 6
KARABÜK SAFRANBOLU DEVLET HASTANESİ	5 2	22	70	18	29	63	0,95	2.84 1	159.3 38	0	0	85	0	42	13 4	35 1	31 8	35 5	0	0	0	0,003 5
KARAMAN DEVLET HASTANESİ	4 1 1	102	254 7	51	10 1	36 9	0,86	17.6 81	698.0 02	6	0	2.8 41	10. 23 6	21 1	1. 07 2	4.4 37	99 8	7.1 25	1.496	14	2.17 3	0,012 6
KARAMAN ERMENEK DEVLET HASTANESİ	1 0 0	12	56	5	14	45	0,93	2.69 9	89.28 0	0	0	0	0	0	18 6	39	21 4	0	252	0	155	0,002 2
KARS DEVLET HASTANESİ	3 6 9	109	310	26	90	29 7	0,92	24.4 81	657. 163	0	0	14 6	0	30 6	1. 40 2	2. 19 5	1. 62 9	21. 67 5	3.100	35	1.1 37	0,003 2
KARS KAĞIZMAN DEVLET HASTANESİ	3 7	18	47	6	15	52	1	2.07 8	111. 998	0	0	1.2 13	4.7 18	0	67	10 3	17 5	29 3	313	6	52	0,001 4
KARS SARIKAMIŞ DEVLET HASTANESİ	3 5	18	59	7	20	34	0,96	3.23 7	87.3 05	0	0	0	0	4	13 4	22 9	36 0	1.4 16	374	1	91	0,000 3
KASTAMONU BOZKURT DEVLET HASTANESİ	2 5	5	37	2	19	9	0,98	795	52.78 3	0	0	62	60 0	0	0	0	0	0	2	0	0	0,011 3
KASTAMONU ÇİDE DEVLET HASTANESİ	4 5	9	33	4	10	14	0,98	366	56.46 6	0	0	27	8.5 00	0	0	3	11	96	28	4	6	0,002 7
KASTAMONU DADAY DEVLET HASTANESİ	2 5	6	27	6	18	8	1	365	28.30 9	0	0	11	2.2 32	0	0	0	0	0	2	0	0	0,002 7
KASTAMONU DR.MÜNİF İSLAMOĞLU DEVLET HASTANESİ	2 1 1	80	248	51	12 3	22 0	0,84	10.9 73	466.3 41	143	0	17 6	1.4 76	24 1	1. 55 6	2.0 39	1.6 15	1.8 91	0	0	0	0,037 3
KASTAMONU İNEBOLU DEVLET HASTANESİ	7 2	12	55	7	21	23	0,87	1.49 0	81.66 1	0	0	75	1.0 91	0	11	10 7	5	5	110	0	92	0,004
KASTAMONU TAŞKÖPRÜ DEVLET HASTANESİ	4 0	17	63	7	43	24	0,95	771	99.77 3	4	0	55	4.9 31	0	13 6	30	13 3	0	114	0	30	0,009 1
KAYSERİ BÜNYAN DEVLET HASTANESİ	3 0	12	73	10	35	17	0,94	1.07 7	154.1 40	0	0	34	0	0	30	16 6	28 8	44	11	2	0	0,000 9

KAYSERİ DEVELİ HATİCE-MUAMMER KOCATÜRK DEVLET HASTANESİ	9 5	31	85	26	18	78	0,91	4.73 2	232.8 60	0	0	51 3	0	33	73 0	2.4 17	3.7 00	2.0 15	425	0	258	0,000 6
KAYSERİ YAHYALI DEVLET HASTANESİ	3 5	11	61	9	13	29	0,99	1.17 3	149.7 91	0	0	1.4 82	4.6 86	0	95	82	54	0	114	37	34	0,000 9
KIRIKKALE DEVLET HASTANESİ	2 1 5	44	170	56	19 9	11 1	0,92	7.47 4	371.3 55	0	0	0	0	15	79 2	1.0 67	1.2 07	32 4	0	0	0	0,008 2
KIRKLARELİ BABAESKİ DEVLET HASTANESİ	5 0	17	56	4	20	39	0,97	2.92 6	206.7 07	0	0	0	1.5 16	0	0	12 4	14 0	34 3	31	0	24	0,001
KIRKLARELİ DEVLET HASTANESİ	3 0 1	71	215	42	96	19 9	0,95	8.97 2	447.0 23	0	0	2.8 18	66 4	14 3	98 3	1.2 90	89 4	2.7 32	277	2	543	0,007 6
KIRKLARELİ VİZE DEVLET HASTANESİ	3 0	11	32	4	7	37	0,94	385	113.8 64	0	0	0	12	0	0	11	1	0	1	0	0	0,007 8
KIRŞEHİR DEVLET HASTANESİ	2 0 0	83	263	43	11 7	16 0	0,89	12.5 75	562.1 55	1	0	6.7 30	28 3.5 09	98	1. 53 9	2.7 54	2.5 32	1.1 54	0	0	0	0,012 7
KIRŞEHİR KAMAN DEVLET HASTANESİ	1 1 0	19	87	19	25	31	0,99	2.15 3	116.1 09	0	0	28	0	0	0	34 5	13 8	50 3	39	49	185	0,000 5
KOCAELİ DARICA FARABİ DEVLET HASTANESİ	2 9 8	90	197	47	37	40 0	0,82	15.5 30	636.4 55	0	0	6.8 56	32. 83 3	27 5	1. 24 9	2.3 98	2.3 00	2.4 27	815	19	390	0,015 1
KOCAELİ DEVLET HASTANESİ	3 2 6	126	341	56	11 2	41 1	0,82	12.0 13	599.3 69	6.026	10.67 1	11. 36 5	32. 61 7	29 5	1. 88 9	2.4 40	2.5 04	3.1 00	0	0	0	0,040 6
KOCAELİ GEBZE FATİH DEVLET HASTANESİ	1 8 4	74	222	41	48	31 8	0,87	12.8 61	704.3 56	0	0	0	20. 08 8	98	1. 21 5	1.7 88	3.1 19	2.7 20	896	10	555	0,005 7
KOCAELİ GÖLCÜK DEVLET HASTANESİ	2 1 0	60	202	30	69	30 2	0,94	9.39 9	464.0 21	0	0	6.1 77	14. 47 0	15 8	84 4	2.3 82	78 2	91 1	960	26	1.09 1	0,010 4
KOCAELİ KANDIRA KAZIM DİNÇ DEVLET HASTANESİ	5 2	29	80	6	44	46	0,97	2.61 6	167.0 50	0	0	4.7 10	14. 42 4	0	22 2	17 7	92	23	144	1	55	0,009 6
KOCAELİ KARAMÜRSEL DEVLET HASTANESİ	5 4	26	86	11	47	51	0,98	2.20 4	201.1 17	0	0	2.7 75	7.9 59	0	10 1	25 4	36 3	46 7	69	0	48	0,009 1
KOCAELİ KÖRFEZ DEVLET HASTANESİ	6 5	23	95	18	22	64	0,95	4.51 3	268.8 57	0	0	0	7.1 71	14	57	59 6	56 4	2.1 90	266	13	327	0,000 2
KONYA AKŞEHİR DEVLET HASTANESİ	1 8 0	60	178	35	65	19 0	0,83	9.30 4	476.6 29	0	0	5.1 83	90 1	66	44 3	1.7 72	88 9	52 1	1.300	8	501	0,002 3
KONYA BEYŞEHİR DEVLET HASTANESİ	1 3 2	44	143	26	59	11 9	0,92	4.30 4	329.5 09	0	0	3.5 30	21 9	34	24 1	90 2	1.4 15	1.7 13	612	3	341	0,007
KONYA ÇİHANBEYLİ DEVLET HASTANESİ	2 9	20	60	6	10	30	0,98	833	170.6 82	0	0	44 1	0	0	7	18 5	13 5	7	159	79	23	0,018
KONYA ÇUMRA DEVLET HASTANESİ	5 6	31	71	12	17	57	0,92	1.43 1	246.6 58	0	0	0	0	1	57	25 4	72 1	5.3 41	214	0	142	0,004 9

KONYA DOĞANHİSAR DEVLET HASTANESİ	30	9	35	5	11	13	0,79	189	66.912	0	0	0	3.199	0	0	1	97	319	0	0	0	0,0159
KONYA EREĞLİ DEVLET HASTANESİ	251	62	196	26	103	237	0,89	8.957	539.233	0	0	3.573	4.488	47	486	2.241	1.589	1.547	1.534	0	515	0,0073
KONYA HÜYÜK DEVLET HASTANESİ	25	12	50	7	6	30	0,91	631	76.765	0	0	167	6.997	0	7	6	46	100	0	0	0	0,0063
KONYA KADINHANI REFİK-SAİME KOYUNCU DEVLET HASTANESİ	34	17	43	8	9	40	1	1.296	94.122	0	0	0	60	0	4	87	124	241	190	2	46	0,0015
KONYA KARAPINAR DEVLET HASTANESİ	38	18	44	7	17	26	0,98	1.833	133.551	0	0	0	0	0	3	145	23	123	328	0	72	0,0016
KONYA NUMUNE HASTANESİ	800	232	593	151	144	546	0,88	27.891	####	556	0	2.731	41.857	1.499	5.802	7.862	11.549	33.654	0	0	0	0,0306
KONYA SEYDİŞEHİR DEVLET HASTANESİ	137	41	142	37	110	94	0,94	6.361	366.166	0	0	3.328	0	18	402	1.028	1.226	927	482	13	383	0,0011
KÜTAHYA DEVLET HASTANESİ	270	86	246	33	117	302	0,73	14.954	524.681	0	0	139	11.143	130	1.439	1.740	1.165	924	509	5	286	0,0144
KÜTAHYA DOÇ.DR.İSMAIL KARAKUYU SİMAV DEVLET HASTANESİ	185	40	126	7	48	116	0,73	8.695	246.649	0	0	56	2.536	53	381	949	566	993	623	14	395	0,0055
KÜTAHYA DOÇ.DR.MUSTAFA KALEMLİ TAŞANLI DEVLET HASTANESİ	232	50	218	72	110	188	0,75	12.459	439.777	0	0	0	6.514	131	735	2.111	1.252	2.698	812	21	935	0,0113
KÜTAHYA EMET DEVLET HASTANESİ	60	14	51	3	32	26	0,76	778	102.992	0	0	25	6.092	0	8	12	9	780	12	0	0	0,009
KÜTAHYA EVLİYA ÇELEBİ DEVLET HASTANESİ	400	82	236	41	138	323	0,74	16.733	503.722	375	0	86	12.532	388	1.653	3.474	2.155	3.208	1.057	3	1.280	0,0189
KÜTAHYA GEDİZ DEVLET HASTANESİ	110	30	88	4	49	80	0,71	4.041	241.041	0	0	16	0	2	143	717	440	388	166	1	261	0,0037
MALATYA DEVLET HASTANESİ	978	245	895	120	341	651	0,77	52.386	####	56	0	2.307	33.196	322	4.154	10.472	9.967	6.563	3.279	875	2.196	0,0022
MALATYA DOĞANŞEHİR DEVLET HASTANESİ	25	21	62	8	28	22	0,83	999	86.426	0	0	1.201	0	4	0	55	8	2	199	0	41	0,002
MALATYA YEŞİLYURT HASAN ÇALIK DEVLET HASTANESİ	60	25	107	3	42	34	0,99	2.379	120.521	0	0	0	61	2	185	363	506	729	3	46	24	0,0004
MANİSA AKHİSAR DEVLET HASTANESİ	200	71	305	30	81	322	0,85	17.067	493.187	0	0	292	4.854	116	1.660	2.189	2.470	9.040	827	12	456	0,0141
MANİSA ALAŞEHİR DEVLET HASTANESİ	145	38	127	27	27	164	0,94	8.025	278.700	0	0	2.823	0	3	279	1.204	1.198	1.041	398	4	219	0,0059
MANİSA DEVLET HASTANESİ	325	117	259	46	72	341	0,88	29.153	832.888	0	0	1.429	8.668	300	3.136	5.619	5.726	17.879	2.297	32	1.670	0,0145

MANİSA KIRKAĞAÇ DEVLET HASTANESİ	25	10	42	4	8	36	0,98	409	63.369	0	0	0	1	0	20	26	68	0	0	0	0	0,0049
MANİSA KULA DEVLET HASTANESİ	68	19	69	4	16	48	0,9	1.644	113.351	0	0	1.884	1.467	25	120	471	427	979	193	0	102	0,0024
MANİSA MERKEZFENDİ DEVLET HASTANESİ	274	77	166	47	76	176	0,92	8.677	475.497	0	0	4.428	4.038	204	1.620	1.475	3.611	7.125	0	0	0	0,0316
MANİSA SALİHLİ DEVLET HASTANESİ	254	75	253	45	74	163	0,86	12.473	587.196	0	0	122	3.019	30	1.183	3.144	2.722	2.938	1.053	13	638	0,0123
MANİSA SARIGÖL DEVLET HASTANESİ	60	8	53	3	12	30	0,94	1.448	80.615	0	0	0	0	2	85	183	102	463	27	0	36	0,0014
MANİSA SARUHANLI DEVLET HASTANESİ	40	17	60	20	18	48	0,93	1.600	116.811	0	0	0	2.326	2	288	164	295	3.008	19	0	31	0,0006
MANİSA SOMA DEVLET HASTANESİ	250	55	189	30	59	200	0,91	9.987	494.071	0	0	1.647	3.145	88	727	1.391	3.362	8.245	746	95	654	0,0064
MANİSA TURGUTLU DEVLET HASTANESİ	228	80	239	29	53	232	0,97	14.028	757.364	0	0	2.321	1.878	97	754	2.837	1.869	1.736	1.308	39	719	0,0098
MARDİN DEVLET HASTANESİ	300	93	197	36	126	134	0,89	7.545	463.722	0	0	561	3.071	160	1.813	2.308	5.266	5.272	0	0	0	0,0093
MARDİN KIZILTEPE DEVLET HASTANESİ	79	69	178	35	70	133	0,78	6.496	667.882	0	0	4.877	4.463	32	522	1.205	1.487	295	2.373	1.258	742	0,0029
MARDİN MİDYAT DEVLET HASTANESİ	50	34	91	8	41	58	0,83	5.994	245.638	0	0	1.587	0	0	93	1.121	144	366	191	352	356	0,0002
MARDİN NUSAYBİN DEVLET HASTANESİ	50	46	134	10	27	82	0,9	6.084	332.136	0	0	181	906	29	247	972	998	783	1.371	120	345	0,0008
MUĞLA BODRUM DEVLET HASTANESİ	77	47	103	40	18	122	0,56	5.943	337.540	12	0	2.097	0	24	537	1.186	739	629	424	10	536	0,0163
MUĞLA DALAMAN DEVLET HASTANESİ	30	10	75	2	18	35	0,89	2.202	143.864	0	0	0	24	0	58	139	110	196	352	0	259	0,0032
MUĞLA DEVLET HASTANESİ	501	108	479	31	131	333	0,95	19.698	670.744	641	0	620	877	194	1.692	2.273	1.933	2.180	413	7	930	0,0172
MUĞLA FETHİYE DEVLET HASTANESİ	223	92	285	54	90	178	0,96	10.592	462.752	0	0	0	0	171	1.081	3.806	4.564	9.180	746	27	1.366	0,0187
MUĞLA KÖYCEĞİZ DEVLET HASTANESİ	42	13	56	6	20	28	0,94	853	133.377	0	0	0	123	0	10	69	116	115	35	0	133	0,0047
MUĞLA MARMARİS DEVLET HASTANESİ	79	43	118	20	25	109	0,96	6.373	271.715	0	0	207	0	5	447	1.049	824	1.541	429	9	378	0,0066
MUĞLA MİLAS 75.YIL DEVLET HASTANESİ	173	53	162	16	30	147	0,75	8.861	330.495	361	0	6.880	1.278	23	787	1.100	590	754	576	17	298	0,0173
MUĞLA ORTACA DEVLET HASTANESİ	52	19	89	17	23	30	0,95	2.518	159.815	0	0	0	0	0	0	248	337	237	128	16	106	0,0016
MUŞ BULANIK DEVLET HASTANESİ	37	23	74	8	14	31	0,87	4.252	202.630	0	0	0	0	63	209	582	940	2.693	762	0	101	0,0089

MUŞ DEVLET HASTANESİ	2 8 9	93	265	22	15 1	23 0	0,75	12.9 12	562.4 97	0	0	63 0	1.2 86	64	1. 73 7	1.7 76	2.6 97	8.6 71	0	0	0	0,007 7
MUŞ HASKÖY DEVLET HASTANESİ	3 0	11	28	2	13	29	0,55	478	88.28 3	0	0	0	0	0	0	0	0	0	0	0	0	0,023
MUŞ MALAZGİRT DEVLET HASTANESİ	5 3	24	69	7	14	57	0,91	3.28 7	164.0 84	0	0	1.9 38	45	3	88	39 2	22 3	28 0	639	270	117	0,001 8
MUŞ VARTO DEVLET HASTANESİ	4 3	12	55	3	12	41	0,78	2.88 8	85.13 8	0	0	0	1.3 73	0	0	20 4	18 3	13 1	527	150	40	0,004 2
NEVŞEHİR DR.İ.ŞEVKİ ATASAGUN DEVLET HASTANESİ	3 0 0	86	254	28	17 4	14 7	0,8	17.2 87	672.3 64	52	0	0	0	18 9	1. 22 8	3.5 01	2.0 48	3.2 23	1.304	0	587	0,006 5
NEVŞEHİR ÜRGÜP DEVLET HASTANESİ	5 0	24	72	24	26	32	0,82	1.17 1	125.1 26	0	0	0	0	1	7	65	17 3	26 3	10	11	7	0,000 9
NİĞDE BOR DEVLET HASTANESİ	6 3	29	99	22	40	60	0,98	5.21 9	281.7 92	0	0	0	0	19 3	25 6	99 9	77 5	56 5	391	237	191	0,001 2
NİĞDE DEVLET HASTANESİ	3 3 0	93	292	58	17 6	30 3	0,84	14.7 89	594.9 09	0	0	77 1	13. 83 4	27 5	88 0	2.5 65	2.2 41	1.0 15	0	0	0	0,012 5
ORDU AKKUŞ DEVLET HASTANESİ	5 0	7	44	2	8	11	0,97	300	51.95 1	0	0	29	0	0	0	0	0	0	18	0	0	0,003 3
ORDU AYBASTI DEVLET HASTANESİ	4 4	11	39	5	10	33	0,91	1.52 2	84.51 4	0	0	1.3 05	31 4	0	15	28	26	20	34	0	4	0,003 3
ORDU BOZTEPE DEVLET HASTANESİ	1 4 8	41	126	17	89	15 0	0,97	6.94 3	247.0 23	0	0	2.3 85	9.6 79	34 7	1. 26 2	2.2 89	5.3 71	1.6 11	0	0	0	0,015 3
ORDU DEVLET HASTANESİ	4 3 8	123	391	41	95	45 8	0,75	27.4 64	687.6 03	934	0	8.3 32	13. 39 1	1. 02 5	3. 02 1	4.3 21	2.9 23	2.3 01	0	0	0	0,021 4
ORDU FATSA DEVLET HASTANESİ	3 1 7	54	252	43	78	29 4	0,93	16.3 89	437.0 26	0	0	6.1 90	7.1 13	43 2	1. 26 5	2.7 88	1.4 24	1.5 18	1.511	0	1.48 2	0,008 9
ORDU KUMRU DEVLET HASTANESİ	5 0	10	42	6	10	37	0,85	421	106.6 96	0	0	0	0	0	0	0	0	0	10	0	0	0,023 8
ORDU ÜNYE DEVLET HASTANESİ	2 7 9	59	210	36	69	15 7	0,8	11.2 21	377.2 11	0	0	17 9	52 3	11 6	1. 11 5	2.3 26	94 1	3.1 32	1.140	1	1.05 1	0,011 2
OSMANİYE BAHÇE DEVLET HASTANESİ	2 5	9	41	13	12	34	0,92	639	73.4 38	0	0	0	0	0	0	1	0	14	11	0	0	0,001 6
SAKARYA AKYAZI DEVLET HASTANESİ	1 0 0	27	74	12	12	72	0,8	2.03 3	265.9 52	0	0	1.2 89	26 7	4	16 2	22 6	18 4	27 6	73	0	29	0,000 5
SAKARYA GEYVE DEVLET HASTANESİ	4 2	18	63	7	26	22	0,95	890	133.1 00	0	0	1.7 84	7.7 54	0	51	17	97	65	43	0	4	0,021 3
SAKARYA HENDEK DEVLET HASTANESİ	5 0	25	62	18	22	53	0,95	5.47 9	215.5 29	0	0	3.0 03	1.4 00	3	10 6	54 9	72 1	18 8	131	221	318	0,003 8
SAKARYA KARASU DEVLET HASTANESİ	5 8	19	71	12	13	50	0,93	3.29 0	176.5 09	0	0	5.0 13	6.3 29	1	72	21 6	55 0	1.2 67	162	1	93	0,003
SAKARYA PAMUKOVA DEVLET HASTANESİ	5 0	11	38	4	16	17	0,92	493	74.50 8	0	0	0	0	0	0	0	24	1	0	0	0	0,002

SAKARYA YENİKENT DEVLET HASTANESİ	250	89	252	28	131	264	0,96	13.008	423.648	678	0	8.230	5.328	60	1.791	2.122	2.192	3.791	63	0	208	0,0235
SAMSUN ALAÇAM DEVLET HASTANESİ	30	9	39	4	17	15	0,9	291	79.832	0	0	0	3.855	0	0	0	0	0	9	0	0	0,0069
SAMSUN BAFRA NAFİZ KURT DEVLET HASTANESİ	275	61	240	35	126	221	0,8	12.129	485.314	0	0	5.330	46	53	991	1.618	1.119	262	955	0	661	0,0032
SAMSUN ÇARŞAMBA DEVLET HASTANESİ	162	56	166	23	82	140	0,87	10.785	402.632	0	0	6.028	6.188	39	1.087	2.489	993	5.112	1.282	9	1.156	0,0039
SAMSUN GAZİ DEVLET HASTANESİ	492	126	421	43	263	488	0,99	20.400	737.341	0	0	5.163	20.245	837	3.002	4.490	5.141	2.859	0	0	0	0,0151
SAMSUN HAVZA DEVLET HASTANESİ	101	19	62	9	44	56	0,95	3.311	159.384	0	0	2.422	0	0	291	307	339	225	203	11	176	0,0088
SAMSUN KAVAK DEVLET HASTANESİ	25	10	47	8	22	23	0,91	499	71.109	0	0	1.213	0	0	0	0	0	0	3	0	0	0,012
SAMSUN LADİK DEVLET HASTANESİ	30	9	32	3	17	20	0,91	912	65.116	0	0	0	0	0	0	0	0	0	45	0	0	0,0044
SAMSUN TERME DEVLET HASTANESİ	96	29	103	19	20	98	0,96	3.593	202.839	0	0	2.144	0	21	240	302	609	394	57	1	36	0,0025
SAMSUN VEZİRKÖPRÜ DEVLET HASTANESİ	190	26	110	11	55	123	0,95	8.154	222.430	0	0	3.903	0	14	267	1.203	613	791	1.261	0	681	0,0009
SİVAS DEVLET HASTANESİ	313	96	306	41	183	290	0,92	20.161	638.487	0	0	2.110	14.599	109	1.539	3.209	2.007	4.779	3.680	36	1.238	0,0002
SİVAS DİVRİĞİ DEVLET HASTANESİ	25	10	52	5	10	21	0,88	377	90.375	0	0	131	0	0	0	0	0	0	10	0	0	0,0106
SİVAS GÜRÜN DEVLET HASTANESİ	50	11	42	5	10	11	0,9	333	53.812	0	0	559	119	0	1	22	3	4	46	0	0	0,003
SİVAS NUMUNE HASTANESİ	504	144	378	66	167	493	0,94	22.939	840.840	0	0	3.821	20.128	693	3.110	5.382	3.226	4.002	0	0	0	0,0033
SİVAS SUŞEHRİ DEVLET HASTANESİ	65	15	60	20	11	47	0,96	2.153	122.859	0	0	463	0	2	209	476	1.356	1.040	334	19	163	0,0381
SİVAS ŞARKIŞLA DEVLET HASTANESİ	65	16	60	19	24	35	0,98	1.752	140.495	0	0	1.433	2.694	0	1	10	2	7	156	0	9	0,0023
SİVAS YILDIZELİ DEVLET HASTANESİ	46	12	56	16	22	24	0,98	2.185	94.847	0	0	0	0	1	36	119	260	1.256	50	0	2	0,0005
SİVAS ZARA DEVLET HASTANESİ	72	10	65	15	11	37	0,83	575	89.023	0	0	1.416	6.262	0	7	101	25	25	88	0	40	0,0017
ŞANLIURFA BALIKLIGÖL DEVLET HASTANESİ	208	86	1184	15	109	207	0,92	10.380	830.805	58	0	2.223	2	169	1.740	1.954	2.463	498	0	0	0	0,0072
ŞANLIURFA BİRECİK DEVLET HASTANESİ	114	42	111	26	24	46	0,96	5.668	323.562	0	0	40	5.436	0	144	517	3.892	9.631	1.161	2	168	0,0026

ŞANLIURFA CEYLANPINAR DEVLET HASTANESİ	7 5	18	64	8	19	88	0,94	2.26 1	280. 160	0	0	0	0	2	15	23 5	33 3	18 4	748	29	197	0,000 9
ŞANLIURFA HARRAN DEVLET HASTANESİ	3 0	14	56	4	4	35	1	1.44 3	99.8 46	0	0	0	3	0	0	24	28 5	94	254	218	0	0,000 7
ŞANLIURFA VİRANŞEHİR DEVLET HASTANESİ	6 1	41	99	24	18	67	0,84	5.04 9	480. 960	0	0	0	0	1. 69 3	26 7	33 0	0	0	3.258	251	536	0,000 6
TEKİRDAĞ ÇERKEZKÖY DEVLET HASTANESİ	1 3 7	53	153	18	27	15 4	0,87	5.96 9	437.1 48	0	0	96	0	65	61 2	1.4 93	1.0 55	72 3	890	0	549	0,006
TEKİRDAĞ ÇORLU DEVLET HASTANESİ	2 4 2	99	251	50	39	23 6	0,98	14.8 98	738.6 05	0	0	10 7	0	19 5	1. 83 0	1.9 95	1.4 47	1.5 49	884	12	1.09 3	0,012 8
TEKİRDAĞ DEVLET HASTANESİ	4 0 0	129	375	62	99	35 6	0,8	25.6 25	838.2 74	802	0	1.0 26	15. 87 5	30 9	1. 99 1	3.4 16	2.3 24	3.5 81	1.264	14	1.16 9	0,016 3
TEKİRDAĞ HAYRABOLU DEVLET HASTANESİ	5 0	13	38	5	14	28	0,99	600	99.88 9	0	0	0	77	0	0	11 0	34	12 6	28	2	4	0,011 7
TEKİRDAĞ MALKARA DEVLET HASTANESİ	8 0	21	78	7	17	47	0,95	3.97 7	153.7 41	0	0	0	2.3 26	40	31 2	38 5	30 1	27 3	264	2	155	0,000 8
TEKİRDAĞ SARAY DEVLET HASTANESİ	7 5	15	45	17	11	37	0,92	2.18 3	99.08 6	0	0	0	0	0	0	37	79	19 4	13	0	10	0,011
TRABZON AKÇAABAT DEVLET HASTANESİ	9 2	36	143	20	56	93	0,86	5.08 1	360.1 27	0	0	69 4	79 1	0	38 2	73 4	77 8	3.1 22	250	0	181	0,004 3
TRABZON ARAKLI BAYRAM HALİL DEVLET HASTANESİ	9 1	15	67	5	37	59	0,95	2.90 7	130.8 32	0	0	3	41	42	76	33 1	22 4	97 8	292	0	140	0,007 9
TRABZON FATİH DEVLET HASTANESİ	3 3 7	97	321	24	17 8	30 7	0,8	13.6 61	670.6 11	0	0	5.7 00	4	67 3	1. 71 9	2.6 64	3.4 11	8.1 36	118	4	274	0,023 1
TRABZON MAÇKA MEHMET AKTÜRK DEVLET HASTANESİ	2 5	6	53	3	11	29	0,92	633	56.28 9	0	0	0	0	0	91	87	11 3	0	0	0	0,006 3	
TRABZON OF DEVLET HASTANESİ	7 9	23	95	3	20	82	0,88	5.39 5	233.8 75	0	0	2.3 18	0	19	16 9	57 8	61 2	31 5	96	103	48	0,004 1
TRABZON SÜRMENE DEVLET HASTANESİ	7 8	17	63	4	33	67	0,97	2.19 2	124.7 96	0	0	2.7 11	0	0	5	58	12 9	17 6	27	0	2	0,003 2
TRABZON TONYA DEVLET HASTANESİ	2 6	5	34	4	9	10	0,98	147	49.49 6	0	0	0	1.1 64	0	0	0	0	9	2	0	0	0,013 6
TRABZON VAKFIKEBİR DEVLET HASTANESİ	1 4 3	32	154	7	60	97	0,84	8.77 7	248.0 24	0	0	3.6 47	0	71	39 9	1.0 11	82 2	85 3	434	237	325	0,003 5
TUNCELİ DEVLET HASTANESİ	1 5 0	56	183	6	79	74	0,93	5.48 6	247.2 03	0	0	0	7.1 59	37 3	31 5	1.2 33	2.2 11	3.5 47	136	12	208	0,002 2
UŞAK BANAZ DEVLET HASTANESİ	6 0	12	74	5	36	29	0,79	2.74 0	124.8 25	0	0	0	0	0	7	11 9	43	47 2	29	4	24	0,002 2
UŞAK DEVLET HASTANESİ	7 5 0	147	683	76	16 1	58 2	0,7	44.9 00	#### ##	0	0	45 0	0	84 7	2. 79 6	7.4 33	5.4 39	3.6 78	1.307	21	2.41 0	0,014 5
UŞAK EŞME DEVLET HASTANESİ	5 0	12	71	3	23	24	0,81	1.31 9	110.9 66	0	0	13 2	29 7	5	68	23 2	27 3	11 0	93	0	56	0,000 8

UŞAK SIVASLI DEVLET HASTANESİ	5 0	8	50	2	19	27	0,89	788	87.54 9	0	0	0	26 9	0	0	0	0	0	0	0	0	0,002 5
VAN BAŞKALE DEVLET HASTANESİ	5 8	19	67	2	10	76	0,94	2.28 6	124.3 59	0	0	26 0	0	0	3	33	99	19 0	551	22	41	0,000 4
VAN ERCİŞ DEVLET HASTANESİ	1 3 2	58	160	20	34	15 1	0,92	7.48 4	409.6 67	0	0	32	0	0	56 7	1.5 60	68 6	86 6	2.504	1.004	590	0,008 2
VAN İPEKYOLU DEVLET HASTANESİ	1 3 2	62	120	7	79	14 1	0,94	6.75 1	483.9 76	0	0	0	8.0 11	11 6	1. 43 9	1.9 34	2.6 76	1.4 31	0	0	0	0,001 3
VAN MURADIYE DEVLET HASTANESİ	6 6	29	88	8	15	77	0,92	3.43 3	186.6 33	51	0	1.7 84	32	37	18 9	74 9	1.0 33	35 4	790	205	182	0,004 1
VAN ÖZALP DEVLET HASTANESİ	2 5	12	93	20	8	44	0,97	1.77 4	199.8 13	0	0	42	1.2 12	0	0	0	0	0	987	99	0	0,000 6
YALOVA DEVLET HASTANESİ	2 0 6	100	240	43	10 0	20 1	0,87	10.0 01	568.0 74	0	0	7.5 00	23. 24 5	26	1. 25 6	2.6 45	3.8 76	9.3 66	948	6	489	0,024 1
YOZGAT AKDAĞMADENİ DEVLET HASTANESİ	5 0	26	59	5	29	22	0,96	1.89 2	139.5 20	0	0	2.3 15	0	0	38	11 2	19 4	13 7	176	0	23	0,002 1
YOZGAT DEVLET HASTANESİ	2 9 0	85	247	18	13 9	17 2	0,96	12.5 91	412.7 72	0	0	2.8 26	0	85	1. 78 4	3.1 73	2.7 53	1.1 88	0	0	0	0,019 3
YOZGAT SORGUN DEVLET HASTANESİ	1 3 0	48	159	31	58	14 6	0,98	7.98 4	379.9 62	0	0	37 8	0	76	44 0	88 3	68 4	1.8 68	872	0	239	0,007 1
YOZGAT YERKÖY DEVLET HASTANESİ	5 9	33	84	15	60	68	0,96	4.51 8	239.4 78	0	0	1.0 45	0	10	36 6	55 0	72 9	61 4	364	10	172	0,000 9
ZONGULDAK ATATÜRK DEVLET HASTANESİ	5 0 3	140	442	80	33 5	64 5	0,85	15.4 72	887.0 67	0	0	84 1	5.2 99	43 0	2. 44 7	4.5 04	3.5 54	6.1 65	0	0	0	0,024 2
ZONGULDAK ÇAYCUMA DEVLET HASTANESİ	1 3 1	34	104	14	62	16 5	0,95	6.81 3	266.7 58	0	0	41 7	16. 41 4	20	77 7	98 8	75 0	68 4	408	0	463	0,010 6
ZONGULDAK DEVLET HASTANESİ	2 5 0	46	186	33	82	19 4	0,82	3.31 7	169.0 57	0	0	16 1	52	19 6	29 1	70 0	1.0 10	13 2	0	0	0	0,008 4
ZONGULDAK DEVREK DEVLET HASTANESİ	5 1	14	66	16	40	45	0,95	1.16 8	118.3 40	0	0	0	4.3 96	3	46	72	16 9	87	20	0	0	0,008 6
ZONGULDAK KARADENİZ EREĞLİ DEVLET HASTANESİ	4 0 4	89	251	50	13 5	35 8	0,79	19.2 74	788.7 68	0	0	62 2	32. 22 1	27 6	1. 26 3	3.4 91	2.8 50	5.4 99	1.159	11	1.54 1	0,008 9

APPENDIX B: Inefficiency estimates using $g = (x, y)$

Hospital Name	CRS	VRS-S	VRS-V	Scale	Congestion
ADANA CEYHAN DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
ADANA ÇUKUROVA DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
ADANA DEVLET HASTANESİ	0,009	0,000	0,000	0,009	0,00000000
ADANA KARAİSALI DEVLET HASTANESİ	0,033	0,000	0,000	0,033	0,00000000
ADANA KOZAN DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
ADANA TUFANBEYLİ DEVLET HASTANESİ	0,138	0,000	0,000	0,138	0,00000000
AFYONKARAHİSAR DEVLET HASTANESİ	0,058	0,000	0,000	0,058	0,00000000
AFYONKARAHİSAR DİNAR DEVLET HASTANESİ	0,196	0,195	0,187	0,001	0,00748683
AFYONKARAHİSAR DR.HALİL İBRAHİM ÖZSOY BOLVADİN DEVLET HASTANESİ	0,044	0,039	0,005	0,005	0,03415007
AFYONKARAHİSAR EMİRDAĞ DEVLET HASTANESİ	0,071	0,039	0,000	0,031	0,03913175
AFYONKARAHİSAR SANDIKLI DEVLET HASTANESİ	0,108	0,107	0,107	0,001	0,00000000
AĞRI DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
AĞRI DİYADİN DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
AĞRI DR.YAŞAR ERYILMAZ DOĞUBEYAZIT DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
AĞRI ELEŞKİRT DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
AMASYA GÜMÜŞHACIKÖY DEVLET HASTANESİ	0,133	0,119	0,119	0,014	0,00000000
AMASYA SABUNCUOĞLU ŞEREFEDDİN DEVLET HASTANESİ	0,045	0,010	0,010	0,035	0,00000000
ANKARA BEYPAZARI DEVLET HASTANESİ	0,140	0,128	0,128	0,013	0,00000000
ANKARA DR.HULUSİ ALATAŞ ELMADAĞ DEVLET HASTANESİ	0,145	0,107	0,107	0,038	0,00000000
ANKARA GÖLBAŞI HASVAK DEVLET HASTANESİ	0,064	0,038	0,038	0,025	0,00000000
ANKARA KAZAN HAMDİ ERİŞ DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
ANKARA KIZILCAHAMAM DEVLET HASTANESİ	0,270	0,223	0,214	0,047	0,00919975
ANKARA NALLIHAN DEVLET HASTANESİ	0,299	0,244	0,244	0,056	0,00005871
ANKARA POLATLI DUATEPE DEVLET HASTANESİ	0,047	0,035	0,035	0,013	0,00000000
ANKARA ŞEREFLİKOÇHİSAR DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
ANTALYA ALANYA DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
ANTALYA ATATÜRK DEVLET HASTANESİ	0,055	0,000	0,000	0,055	0,00000000
ANTALYA DEMRE DEVLET HASTANESİ	0,166	0,098	0,033	0,068	0,06430703
ANTALYA ELMALI DEVLET HASTANESİ	0,192	0,141	0,037	0,051	0,10408412
ANTALYA FİNİKE DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
ANTALYA GAZİPAŞA DEVLET HASTANESİ	0,096	0,074	0,066	0,022	0,00759673
ANTALYA KAŞ DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
ANTALYA KEMER DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
ANTALYA KORKUTELİ DEVLET HASTANESİ	0,108	0,035	0,000	0,073	0,03539355
ANTALYA KUMLUCA DEVLET HASTANESİ	0,016	0,006	0,000	0,010	0,00578131
ANTALYA MANAVGAT DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
ANTALYA SERİK DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000

ARTVİN ARHAVİ DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
ARTVİN BORÇKA DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
ARTVİN DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
ARTVİN HOPA DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
ARTVİN ŞAĞSAT DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
ARTVİN YUSUFELİ DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
AYDIN ATATÜRK DEVLET HASTANESİ	0,060	0,041	0,041	0,019	0,00000000
AYDIN ÇİNE DEVLET HASTANESİ	0,096	0,060	0,020	0,035	0,04081865
AYDIN DEVLET HASTANESİ	0,069	0,000	0,000	0,069	0,00000000
AYDIN DİDİM DEVLET HASTANESİ	0,028	0,015	0,015	0,013	0,00000000
AYDIN GERMENCİK DEVLET HASTANESİ	0,218	0,000	0,000	0,218	0,00000000
AYDIN KUŞADASI DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
AYDIN NAZİLLİ DEVLET HASTANESİ	0,109	0,000	0,000	0,109	0,00000000
AYDIN SÖKE FEHİME FAİK KOCAGÖZ DEVLET HASTANESİ	0,105	0,090	0,090	0,015	0,00000000
BALIKESİR ATATÜRK DEVLET HASTANESİ	0,030	0,009	0,009	0,021	0,00000000
BALIKESİR AYVALIK DEVLET HASTANESİ	0,236	0,236	0,236	0,001	0,00000000
BALIKESİR BİGADİÇ DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
BALIKESİR BURHANIYE DEVLET HASTANESİ	0,070	0,036	0,036	0,034	0,00000000
BALIKESİR DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
BALIKESİR DURSUNBEY DEVLET HASTANESİ	0,267	0,213	0,203	0,055	0,01021189
BALIKESİR EDREMIT DEVLET HASTANESİ	0,004	0,000	0,000	0,004	0,00000000
BALIKESİR ERDEK NEYYİRE SITKI DEVLET HASTANESİ	0,197	0,000	0,000	0,197	0,00000000
BALIKESİR GÖNEN DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
BALIKESİR HAVRAN DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
BALIKESİR İVRİNDİ DEVLET HASTANESİ	0,124	0,000	0,000	0,124	0,00000000
BALIKESİR MANYAS DEVLET HASTANESİ	0,095	0,000	0,000	0,095	0,00000000
BALIKESİR SINDIRGI DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
BALIKESİR SUSURLUK DEVLET HASTANESİ	0,110	0,086	0,086	0,023	0,00000000
BARTIN DEVLET HASTANESİ	0,060	0,045	0,045	0,015	0,00000000
BATMAN BÖLGE DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
BİLECİK BOZÜYÜK DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
BİLECİK DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
BİNGÖL DEVLET HASTANESİ	0,084	0,084	0,079	0,000	0,00520938
BİTLİS AHLAT DEVLET HASTANESİ	0,183	0,156	0,014	0,027	0,14173092
BİTLİS DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
BİTLİS TATVAN DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
BOLU GEREDİ DEVLET HASTANESİ	0,247	0,215	0,177	0,032	0,03807506
BOLU İZZET BAYSAL DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
BURDUR BUCAK DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
BURDUR DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
BURSA ÇEKİRGE DEVLET HASTANESİ	0,012	0,000	0,000	0,012	0,00000000

BURSA DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
BURSA GEMLİK MUAMMER AĞIM DEVLET HASTANESİ	0,094	0,090	0,090	0,004	0,00000000
BURSA İNEGÖL DEVLET HASTANESİ	0,023	0,009	0,009	0,015	0,00000000
BURSA İZNİK DEVLET HASTANESİ	0,032	0,000	0,000	0,032	0,00000000
BURSA KARACABEY DEVLET HASTANESİ	0,187	0,187	0,187	0,001	0,00000000
BURSA M.KEMALPAŞA DEVLET HASTANESİ	0,079	0,050	0,050	0,028	0,00000000
BURSA MUDANYA ŞAZİYE RÜŞTÜ DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
BURSA ORHANGAZİ DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
BURSA ŞEVKET YILMAZ DEVLET HASTANESİ	0,056	0,000	0,000	0,056	0,00000000
BURSA YENİŞEHİR DEVLET HASTANESİ	0,058	0,052	0,052	0,006	0,00000000
ÇANAKKALE AYVACIK DEVLET HASTANESİ	0,087	0,000	0,000	0,087	0,00000000
ÇANAKKALE BAYRAMIÇ DEVLET HASTANESİ	0,019	0,000	0,000	0,019	0,00000000
ÇANAKKALE BİGA DEVLET HASTANESİ	0,173	0,170	0,170	0,003	0,00000000
ÇANAKKALE ÇAN DEVLET HASTANESİ	0,158	0,157	0,157	0,001	0,00013270
ÇANAKKALE DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
ÇANAKKALE EZİNE DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
ÇANAKKALE GELİBOLU DEVLET HASTANESİ	0,084	0,011	0,000	0,073	0,01055772
ÇANKIRI ÇERKEŞ DEVLET HASTANESİ	0,135	0,000	0,000	0,135	0,00000000
ÇANKIRI DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
ÇORUM ALACA DEVLET HASTANESİ	0,018	0,000	0,000	0,018	0,00000000
ÇORUM BAYAT DEVLET HASTANESİ	0,293	0,098	0,004	0,195	0,09416773
ÇORUM DEVLET HASTANESİ	0,047	0,000	0,000	0,047	0,00000000
ÇORUM İSKİLİP DEVLET HASTANESİ	0,083	0,071	0,071	0,011	0,00003324
ÇORUM KARGI DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
ÇORUM MECİTÖZÜ DEVLET HASTANESİ	0,172	0,074	0,074	0,098	0,00000000
ÇORUM OSMANCIK DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
ÇORUM SUNGURLU DEVLET HASTANESİ	0,122	0,106	0,064	0,016	0,04206503
DENİZLİ ACIPAYAM DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
DENİZLİ BULDAN ARIF CERİT DEVLET HASTANESİ	0,348	0,069	0,000	0,278	0,06949937
DENİZLİ ÇARDAK DEVLET HASTANESİ	0,173	0,000	0,000	0,173	0,00000000
DENİZLİ ÇİVRİL DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
DENİZLİ DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
DENİZLİ HONAZ DEVLET HASTANESİ	0,223	0,091	0,011	0,132	0,07987229
DENİZLİ KALE DEVLET HASTANESİ	0,212	0,104	0,086	0,107	0,01829056
DENİZLİ SARAYKÖY DEVLET HASTANESİ	0,242	0,168	0,082	0,074	0,08595215
DENİZLİ SERVERGAZİ DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
DENİZLİ TAVAS DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
DİYARBAKIR BİSMİL DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
DİYARBAKIR ÇERMİK DEVLET HASTANESİ	0,139	0,119	0,018	0,019	0,10181328
DÜZCE AKÇAKOCA DEVLET HASTANESİ	0,229	0,151	0,146	0,078	0,00555538
DÜZCE ATATÜRK DEVLET HASTANESİ	0,104	0,098	0,054	0,005	0,04376441

EDİRNE DEVLET HASTANESİ	0,041	0,000	0,000	0,041	0,00000000
EDİRNE İPSALA DEVLET HASTANESİ	0,006	0,000	0,000	0,006	0,00000000
EDİRNE KEŞAN DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
EDİRNE UZUNKÖPRÜ DEVLET HASTANESİ	0,033	0,031	0,029	0,002	0,00173321
ELAZIĞ HARPUT DEVLET HASTANESİ	0,061	0,051	0,000	0,010	0,05125627
ELAZIĞ KOVANCILAR DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
ERZİNCAN DEVLET HASTANESİ	0,078	0,027	0,027	0,052	0,00000000
ERZURUM HORASAN DEVLET HASTANESİ	0,126	0,080	0,066	0,046	0,01428441
ERZURUM OLTU DEVLET HASTANESİ	0,048	0,016	0,002	0,032	0,01360232
ESKİŞEHİR ÇİFTELER DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
ESKİŞEHİR DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
ESKİŞEHİR SİVRİHİSAR DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
ESKİŞEHİR YUNUS EMRE DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
GİRESUN BULANCAK DEVLET HASTANESİ	0,229	0,224	0,224	0,005	0,00000000
GİRESUN DERELİ DEVLET HASTANESİ	0,194	0,000	0,000	0,194	0,00000000
GİRESUN PROF. DR. A. İLHAN ÖZDEMİR DEVLET HASTANESİ	0,189	0,163	0,163	0,027	0,00000000
GİRESUN Ş.KARAHİSAR DEVLET HASTANESİ	0,241	0,195	0,195	0,046	0,00000000
GİRESUN TİREBOLU DEVLET HASTANESİ	0,050	0,048	0,048	0,002	0,00000000
GÜMÜŞHANE DEVLET HASTANESİ	0,021	0,018	0,018	0,003	0,00000000
GÜMÜŞHANE KELKİT DEVLET HASTANESİ	0,170	0,101	0,012	0,070	0,08838857
HAKKARİ DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
HAKKARİ ŞEMDİNLİ DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
HAKKARİ YÜKSEKOVA DEVLET HASTANESİ	0,012	0,011	0,011	0,001	0,00000000
IĞDIR DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
IĞDIR TUZLUCA DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
İSTANBUL BAYRAMPAŞA DEVLET HASTANESİ	0,014	0,006	0,001	0,008	0,00453147
İSTANBUL BÜYÜKÇEKMECE DEVLET HASTANESİ	0,005	0,000	0,000	0,005	0,00000000
İSTANBUL ÇATALCA İLYAS ÇOKAY DEVLET HASTANESİ	0,003	0,000	0,000	0,003	0,00000000
İSTANBUL ESENYURT DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
İSTANBUL EYÜP DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
İSTANBUL KARTAL YAVUZ SELİM DEVLET HASTANESİ	0,010	0,000	0,000	0,010	0,00000000
İSTANBUL LÜTFİYE NURİ BURAT DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
İSTANBUL PAŞABAHÇE DEVLET HASTANESİ	0,086	0,015	0,000	0,070	0,01536577
İSTANBUL PENDİK DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
İSTANBUL SARIYER İSMAİL AKGÜN DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
İSTANBUL SARIYER İSTİNYE DEVLET HASTANESİ	0,061	0,030	0,030	0,031	0,00000000
İSTANBUL ÜSKÜDAR DEVLET HASTANESİ	0,020	0,000	0,000	0,020	0,00000000
İZMİR ALİAĞA DEVLET HASTANESİ	0,115	0,115	0,083	0,000	0,03134101
İZMİR ALSANCAK NEVVAR SALİH İŞGÖREN DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
İZMİR BAYINDIR DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
İZMİR BUCA SEYFİ DEMİRSOY DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000

İZMİR ÇİĞLİ DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
İZMİR DR.FARUK İLKER BERGAMA DEVLET HASTANESİ	0,174	0,174	0,174	0,000	0,00000000
İZMİR FOÇA DEVLET HASTANESİ	0,171	0,000	0,000	0,171	0,00000000
İZMİR KARŞIYAKA DEVLET HASTANESİ	0,192	0,052	0,052	0,140	0,00000000
İZMİR KIRAZ DEVLET HASTANESİ	0,145	0,000	0,000	0,145	0,00000000
İZMİR M.ENVER ŞENERDEM TORBALI DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
İZMİR MENEMEN DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
İZMİR NEJAT HEPKON SEFERİHİSAR DEVLET HASTANESİ	0,082	0,022	0,009	0,060	0,01375247
İZMİR ÖDEMiŞ DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
İZMİR SELÇUK DEVLET HASTANESİ	0,101	0,076	0,061	0,025	0,01474149
İZMİR TİRE DR.ERTUĞRUL AKER DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
İZMİR URLA DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
KAHRAMANMARAŞ AFŞİN DEVLET HASTANESİ	0,015	0,011	0,000	0,004	0,01069967
KAHRAMANMARAŞ ANDIRIN DEVLET HASTANESİ	0,274	0,000	0,000	0,274	0,00000000
KAHRAMANMARAŞ DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
KAHRAMANMARAŞ DR.SÜREYYA ADANALI GÖKSUN DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
KAHRAMANMARAŞ ELBİSTAN DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
KAHRAMANMARAŞ PAZARCIK DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
KAHRAMANMARAŞ YENİŞEHİR DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
KARABÜK DEVLET HASTANESİ	0,016	0,000	0,000	0,016	0,00000000
KARABÜK SAFRANBOLU DEVLET HASTANESİ	0,198	0,176	0,167	0,022	0,00873553
KARAMAN DEVLET HASTANESİ	0,017	0,000	0,000	0,017	0,00000000
KARAMAN ERMENEK DEVLET HASTANESİ	0,096	0,000	0,000	0,096	0,00000000
KARS DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
KARS KAĞIZMAN DEVLET HASTANESİ	0,132	0,000	0,000	0,132	0,00003950
KARS SARIKAMIŞ DEVLET HASTANESİ	0,078	0,010	0,000	0,069	0,00975211
KASTAMONU BOZKURT DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
KASTAMONU CİDE DEVLET HASTANESİ	0,140	0,000	0,000	0,140	0,00000000
KASTAMONU DADAY DEVLET HASTANESİ	0,323	0,000	0,000	0,323	0,00000000
KASTAMONU DR.MÜNİF İSLAMOĞLU DEVLET HASTANESİ	0,154	0,137	0,137	0,017	0,00000000
KASTAMONU İNEBOLU DEVLET HASTANESİ	0,206	0,120	0,107	0,086	0,01281816
KASTAMONU TAŞKÖPRÜ DEVLET HASTANESİ	0,173	0,134	0,134	0,040	0,00000000
KAYSERİ BÜNYAN DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
KAYSERİ DEVELİ HATİCE-MUAMMER KOCATÜRK DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
KAYSERİ YAHYALI DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
KIRIKKALE DEVLET HASTANESİ	0,073	0,059	0,059	0,014	0,00000000
KIRKLARELİ BABAESKİ DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
KIRKLARELİ DEVLET HASTANESİ	0,191	0,187	0,185	0,004	0,00214346
KIRKLARELİ VİZE DEVLET HASTANESİ	0,051	0,000	0,000	0,051	0,00000000
KIRŞEHİR DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
KIRŞEHİR KAMAN DEVLET HASTANESİ	0,127	0,053	0,000	0,075	0,05273802

KOCAELİ DARICA FARABİ DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
KOCAELİ DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
KOCAELİ GEBZE FATİH DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
KOCAELİ GÖLCÜK DEVLET HASTANESİ	0,045	0,042	0,042	0,003	0,00000000
KOCAELİ KANDIRA KAZIM DİNÇ DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
KOCAELİ KARAMÜRSEL DEVLET HASTANESİ	0,089	0,088	0,088	0,001	0,00000000
KOCAELİ KÖRFEZ DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
KONYA AKŞEHİR DEVLET HASTANESİ	0,084	0,068	0,000	0,016	0,06805065
KONYA BEYŞEHİR DEVLET HASTANESİ	0,141	0,113	0,113	0,029	0,00000000
KONYA CİHANBEYLİ DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
KONYA ÇUMRA DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
KONYA DOĞANHİSAR DEVLET HASTANESİ	0,083	0,000	0,000	0,083	0,00000000
KONYA EREĞLİ DEVLET HASTANESİ	0,054	0,018	0,018	0,036	0,00000000
KONYA HÜYÜK DEVLET HASTANESİ	0,030	0,000	0,000	0,030	0,00000000
KONYA KADINHANI REFİK-SAİME KOYUNCU DEVLET HASTANESİ	0,321	0,123	0,020	0,198	0,10321440
KONYA KARAPINAR DEVLET HASTANESİ	0,121	0,058	0,000	0,063	0,05824169
KONYA NUMUNE HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
KONYA SEYDİŞEHİR DEVLET HASTANESİ	0,049	0,025	0,000	0,024	0,02481436
KÜTAHYA DEVLET HASTANESİ	0,163	0,151	0,151	0,012	0,00000000
KÜTAHYA DOÇ.DR.İSMAIL KARAKUYU SİMAV DEVLET HASTANESİ	0,009	0,007	0,007	0,002	0,00000000
KÜTAHYA DOÇ.DR.MUSTAFA KALEMLİ TAVŞANLI DEVLET HASTANESİ	0,013	0,001	0,001	0,012	0,00000000
KÜTAHYA EMET DEVLET HASTANESİ	0,050	0,000	0,000	0,050	0,00000000
KÜTAHYA EVLİYA ÇELEBİ DEVLET HASTANESİ	0,041	0,032	0,032	0,008	0,00000000
KÜTAHYA GEDİZ DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
MALATYA DEVLET HASTANESİ	0,045	0,000	0,000	0,045	0,00000000
MALATYA DOĞANŞEHİR DEVLET HASTANESİ	0,147	0,000	0,000	0,147	0,00000000
MALATYA YEŞİLYURT HASAN ÇALIK DEVLET HASTANESİ	0,043	0,000	0,000	0,043	0,00000000
MANİSA AKHİSAR DEVLET HASTANESİ	0,024	0,023	0,023	0,000	0,00000000
MANİSA ALAŞEHİR DEVLET HASTANESİ	0,054	0,050	0,050	0,004	0,00000000
MANİSA DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
MANİSA KIRKAĞAÇ DEVLET HASTANESİ	0,337	0,000	0,000	0,337	0,00000000
MANİSA KULA DEVLET HASTANESİ	0,021	0,000	0,000	0,021	0,00000000
MANİSA MERKEZEFENDİ DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
MANİSA SALİHLİ DEVLET HASTANESİ	0,049	0,000	0,000	0,048	0,00000000
MANİSA SARIGÖL DEVLET HASTANESİ	0,081	0,000	0,000	0,081	0,00000000
MANİSA SARUHANLI DEVLET HASTANESİ	0,024	0,000	0,000	0,024	0,00000000
MANİSA SOMA DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
MANİSA TURGUTLU DEVLET HASTANESİ	0,007	0,000	0,000	0,007	0,00000000
MARDİN DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
MARDİN KIZILTEPE DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
MARDİN MİDYAT DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000

MARDİN NUSAYBİN DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
MUĞLA BODRUM DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
MUĞLA DALAMAN DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
MUĞLA DEVLET HASTANESİ	0,135	0,077	0,077	0,059	0,00000000
MUĞLA FETHİYE DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
MUĞLA KÖYCEĞİZ DEVLET HASTANESİ	0,089	0,060	0,053	0,029	0,00642041
MUĞLA MARMARİS DEVLET HASTANESİ	0,128	0,120	0,119	0,009	0,00045371
MUĞLA MİLAS 75.YIL DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
MUĞLA ORTACA DEVLET HASTANESİ	0,108	0,102	0,047	0,006	0,05501607
MUŞ BULANIK DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
MUŞ DEVLET HASTANESİ	0,125	0,060	0,060	0,065	0,00000000
MUŞ HASKÖY DEVLET HASTANESİ	0,124	0,000	0,000	0,124	0,00000000
MUŞ MALAZGİRT DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
MUŞ VARTO DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
NEVŞEHİR DR.İ.ŞEVKİ ATASAGUN DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
NEVŞEHİR ÜRGÜP DEVLET HASTANESİ	0,323	0,264	0,164	0,058	0,10027045
NİĞDE BOR DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
NİĞDE DEVLET HASTANESİ	0,176	0,165	0,165	0,011	0,00000000
ORDU AKKUŞ DEVLET HASTANESİ	0,109	0,000	0,000	0,109	0,00000000
ORDU AYBASTI DEVLET HASTANESİ	0,140	0,043	0,000	0,097	0,04348764
ORDU BOZTEPE DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
ORDU DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
ORDU FATSA DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
ORDU KUMRU DEVLET HASTANESİ	0,100	0,040	0,040	0,060	0,00000000
ORDU ÜNYE DEVLET HASTANESİ	0,038	0,036	0,036	0,003	0,00000000
OSMANİYE BAĞÇE DEVLET HASTANESİ	0,288	0,000	0,000	0,288	0,00000000
SAKARYA AKYAZI DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
SAKARYA GEYVE DEVLET HASTANESİ	0,002	0,000	0,000	0,002	0,00000000
SAKARYA HENDEK DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
SAKARYA KARASU DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
SAKARYA PAMUKOVA DEVLET HASTANESİ	0,183	0,098	0,010	0,085	0,08833686
SAKARYA YENİKENT DEVLET HASTANESİ	0,049	0,019	0,019	0,030	0,00000000
SAMSUN ALAÇAM DEVLET HASTANESİ	0,062	0,009	0,000	0,053	0,00909346
SAMSUN BAFRA NAFİZ KURT DEVLET HASTANESİ	0,080	0,063	0,000	0,018	0,06253674
SAMSUN ÇARŞAMBA DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
SAMSUN GAZİ DEVLET HASTANESİ	0,073	0,049	0,048	0,024	0,00077091
SAMSUN HAVZA DEVLET HASTANESİ	0,028	0,016	0,016	0,012	0,00000000
SAMSUN KAVAK DEVLET HASTANESİ	0,177	0,000	0,000	0,177	0,00000000
SAMSUN LADİK DEVLET HASTANESİ	0,241	0,071	0,049	0,170	0,02203852
SAMSUN TERME DEVLET HASTANESİ	0,193	0,187	0,180	0,006	0,00685945
SAMSUN VEZİRKÖPRÜ DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000

SİVAS DEVLET HASTANESİ	0,019	0,000	0,000	0,019	0,00000000
SİVAS DİVRİĞİ DEVLET HASTANESİ	0,132	0,000	0,000	0,132	0,00000000
SİVAS GÜRÜN DEVLET HASTANESİ	0,195	0,107	0,000	0,088	0,10738606
SİVAS NUMUNE HASTANESİ	0,112	0,082	0,000	0,030	0,08195291
SİVAS SUŞEHİRİ DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
SİVAS ŞARKIŞLA DEVLET HASTANESİ	0,129	0,120	0,089	0,009	0,03142514
SİVAS YILDIZELİ DEVLET HASTANESİ	0,079	0,026	0,000	0,053	0,02634806
SİVAS ZARA DEVLET HASTANESİ	0,099	0,000	0,000	0,099	0,00000000
ŞANLIURFA BALIKLIĞÖL DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
ŞANLIURFA BİRECİK DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
ŞANLIURFA CEYLANPINAR DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
ŞANLIURFA HARRAN DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
ŞANLIURFA VİRANŞEHİR DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
TEKİRDAĞ ÇERKEZKÖY DEVLET HASTANESİ	0,013	0,012	0,012	0,001	0,00000000
TEKİRDAĞ ÇORLU DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
TEKİRDAĞ DEVLET HASTANESİ	0,097	0,064	0,064	0,033	0,00000000
TEKİRDAĞ HAYRABOLU DEVLET HASTANESİ	0,185	0,144	0,144	0,042	0,00000000
TEKİRDAĞ MALKARA DEVLET HASTANESİ	0,066	0,026	0,000	0,039	0,02636600
TEKİRDAĞ SARAY DEVLET HASTANESİ	0,175	0,158	0,158	0,017	0,00000000
TRABZON AKÇAABAT DEVLET HASTANESİ	0,038	0,021	0,021	0,017	0,00000000
TRABZON ARAKLI BAYRAM HALİL DEVLET HASTANESİ	0,087	0,057	0,057	0,030	0,00000000
TRABZON FATİH DEVLET HASTANESİ	0,046	0,000	0,000	0,046	0,00000000
TRABZON MAÇKA MEHMET AKTÜRK DEVLET HASTANESİ	0,078	0,000	0,000	0,078	0,00000000
TRABZON OF DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
TRABZON SÜRMENE DEVLET HASTANESİ	0,072	0,045	0,042	0,027	0,00292341
TRABZON TONYA DEVLET HASTANESİ	0,058	0,000	0,000	0,058	0,00000000
TRABZON VAKFIKEBİR DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
TUNCELİ DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
UŞAK BANAZ DEVLET HASTANESİ	0,020	0,012	0,000	0,008	0,01204032
UŞAK DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
UŞAK EŞME DEVLET HASTANESİ	0,032	0,000	0,000	0,032	0,00000000
UŞAK SİVASLI DEVLET HASTANESİ	0,122	0,000	0,000	0,122	0,00000000
VAN BAŞKALE DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
VAN ERCİŞ DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
VAN İPEKYOLU DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
VAN MURADIYE DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
VAN ÖZALP DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
YALOVA DEVLET HASTANESİ	0,016	0,000	0,000	0,016	0,00000000
YOZGAT AKDAĞMADENİ DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
YOZGAT DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000
YOZGAT SORGUN DEVLET HASTANESİ	0,138	0,130	0,130	0,008	0,00000000

YOZGAT YERKÖY DEVLET HASTANESİ	0,105	0,090	0,036	0,016	0,05386230
ZONGULDAK ATATÜRK DEVLET HASTANESİ	0,163	0,086	0,086	0,077	0,00000000
ZONGULDAK ÇAYCUMA DEVLET HASTANESİ	0,005	0,000	0,000	0,005	0,00000000
ZONGULDAK DEVLET HASTANESİ	0,451	0,450	0,450	0,001	0,00000000
ZONGULDAK DEVREK DEVLET HASTANESİ	0,213	0,192	0,192	0,021	0,00000000
ZONGULDAK KARADENİZ EREĞLİ DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,00000000



APPENDIX C: Inefficiency estimates using different Direction Vectors

Hospital Name	Normalized Endogenous	x 0	0 y	x y	xbar ybar	1 1
ADANA CEYHAN DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
ADANA ÇUKUROVA DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
ADANA DEVLET HASTANESİ	20,518	0,019	0,019	0,009	0,026	3,979
ADANA KARAİSALI DEVLET HASTANESİ	2,273	0,064	0,070	0,033	0,004	0,332
ADANA KOZAN DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
ADANA TUFANBEYLİ DEVLET HASTANESİ	5,619	0,241	0,325	0,138	0,018	1,016
AFYONKARAHİSAR DEVLET HASTANESİ	104,910	0,108	0,125	0,058	0,167	13,950
AFYONKARAHİSAR DİNAR DEVLET HASTANESİ	25,125	0,328	0,488	0,196	0,086	6,513
AFYONKARAHİSAR DR.HALİL İBRAHİM ÖZSOY BOLVADİN DEVLET HASTANESİ	9,375	0,085	0,092	0,044	0,022	2,074
AFYONKARAHİSAR EMİRDAĞ DEVLET HASTANESİ	8,055	0,132	0,152	0,071	0,019	1,253
AFYONKARAHİSAR SANDIKLI DEVLET HASTANESİ	31,841	0,194	0,242	0,108	0,077	8,207
AĞRI DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
AĞRI DIYADİN DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
AĞRI DR.YAŞAR ERYILMAZ DOĞUBEYAZIT DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
AĞRI ELEŞKİRT DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
AMASYA GÜMÜŞHACIKÖY DEVLET HASTANESİ	21,159	0,211	0,359	0,133	0,037	4,041
AMASYA SABUNCUOĞLU ŞEREFEDDİN DEVLET HASTANESİ	56,475	0,087	0,095	0,045	0,097	6,408
ANKARA BEYPAZARI DEVLET HASTANESİ	43,952	0,242	0,334	0,140	0,083	9,431
ANKARA DR.HULUSİ ALATAŞ ELMADAĞ DEVLET HASTANESİ	22,667	0,242	0,362	0,145	0,043	10,410
ANKARA GÖLBAŞI HASVAK DEVLET HASTANESİ	19,009	0,117	0,140	0,064	0,025	2,328
ANKARA KAZAN HAMDİ ERİŞ DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
ANKARA KIZILCAHAMAM DEVLET HASTANESİ	31,169	0,424	0,740	0,270	0,092	12,952
ANKARA NALLIHAN DEVLET HASTANESİ	19,328	0,443	0,910	0,299	0,075	2,484
ANKARA POLATLI DUATEPE DEVLET HASTANESİ	41,927	0,088	0,101	0,047	0,092	7,437
ANKARA ŞEREFLİKOÇHİSAR DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
ANTALYA ALANYA DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
ANTALYA ATATÜRK DEVLET HASTANESİ	59,287	0,104	0,116	0,055	0,188	30,407
ANTALYA DEMRE DEVLET HASTANESİ	11,666	0,278	0,397	0,166	0,032	2,971
ANTALYA ELMALI DEVLET HASTANESİ	16,319	0,322	0,476	0,192	0,059	6,903
ANTALYA FİNİKE DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
ANTALYA GAZİPAŞA DEVLET HASTANESİ	12,379	0,170	0,218	0,096	0,044	6,818
ANTALYA KAŞ DEVLET HASTANESİ	7,817	0,000	0,000	0,000	0,000	0,743
ANTALYA KEMER DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
ANTALYA KORKUTELİ DEVLET HASTANESİ	4,680	0,195	0,243	0,108	0,049	10,046
ANTALYA KUMLUCA DEVLET HASTANESİ	0,000	0,031	0,032	0,016	0,010	0,818

ANTALYA MANAVGAT DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
ANTALYA SERİK DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
ARTVİN ARHAVİ DEVLET HASTANESİ	13,903	0,000	0,000	0,000	0,000	1,210
ARTVİN BORÇKA DEVLET HASTANESİ	4,217	0,000	0,000	0,000	0,000	0,004
ARTVİN DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
ARTVİN HOPA DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
ARTVİN ŞAĞŞAT DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
ARTVİN YUSUFELİ DEVLET HASTANESİ	6,373	0,000	0,000	0,000	0,000	1,547
AYDIN ATATÜRK DEVLET HASTANESİ	84,445	0,111	0,129	0,060	0,126	11,382
AYDIN ÇİNE DEVLET HASTANESİ	13,924	0,175	0,212	0,096	0,047	4,218
AYDIN DEVLET HASTANESİ	78,750	0,129	0,148	0,069	0,280	20,739
AYDIN DİDİM DEVLET HASTANESİ	10,495	0,053	0,060	0,028	0,013	1,551
AYDIN GERMENCİK DEVLET HASTANESİ	12,808	0,355	0,563	0,218	0,044	5,235
AYDIN KUŞADASI DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
AYDIN NAZİLLİ DEVLET HASTANESİ	104,554	0,193	0,251	0,109	0,246	21,877
AYDIN ŞÖKE FEHİME FAİK KOCAGÖZ DEVLET HASTANESİ	43,342	0,185	0,242	0,105	0,082	6,629
BALIKESİR ATATÜRK DEVLET HASTANESİ	46,922	0,058	0,064	0,030	0,076	5,077
BALIKESİR AYVALIK DEVLET HASTANESİ	52,732	0,375	0,638	0,236	0,133	10,359
BALIKESİR BİGADİÇ DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
BALIKESİR BURHANİYE DEVLET HASTANESİ	27,783	0,126	0,156	0,070	0,053	5,696
BALIKESİR DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
BALIKESİR DURSUNBEY DEVLET HASTANESİ	17,837	0,411	0,746	0,267	0,059	4,180
BALIKESİR EDREMİT DEVLET HASTANESİ	17,555	0,007	0,008	0,004	0,006	1,300
BALIKESİR ERDEK NEYYİRE SITKI DEVLET HASTANESİ	19,894	0,321	0,511	0,197	0,048	4,564
BALIKESİR GÖNEN DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
BALIKESİR HAVRAN DEVLET HASTANESİ	10,029	0,000	0,000	0,000	0,000	1,429
BALIKESİR İVRİNDİ DEVLET HASTANESİ	11,190	0,209	0,301	0,124	0,018	1,383
BALIKESİR MANYAS DEVLET HASTANESİ	11,541	0,166	0,219	0,095	0,017	1,360
BALIKESİR SINDIRGI DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
BALIKESİR SUSURLUK DEVLET HASTANESİ	17,064	0,193	0,252	0,110	0,032	3,838
BARTIN DEVLET HASTANESİ	66,666	0,108	0,134	0,060	0,092	8,602
BATMAN BÖLGE DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
BİLECİK BOZÜYÜK DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
BİLECİK DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
BİNGÖL DEVLET HASTANESİ	47,227	0,155	0,184	0,084	0,131	7,740
BİTLİS AHLAT DEVLET HASTANESİ	8,250	0,309	0,448	0,183	0,047	4,686
BİTLİS DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
BİTLİS TATVAN DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
BOLU GEREDE DEVLET HASTANESİ	17,810	0,395	0,660	0,247	0,091	7,356
BOLU İZZET BAYSAL DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
BURDUR BUCAK DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000

BURDUR DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
BURSA ÇEKİRGE DEVLET HASTANESİ	56,983	0,024	0,025	0,012	0,052	9,421
BURSA DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
BURSA GEMLİK MUAMMER AĞIM DEVLET HASTANESİ	47,422	0,169	0,210	0,094	0,108	7,076
BURSA İNEGÖL DEVLET HASTANESİ	35,371	0,044	0,048	0,023	0,042	4,282
BURSA İZNİK DEVLET HASTANESİ	0,000	0,062	0,066	0,032	0,011	0,555
BURSA KARACABEY DEVLET HASTANESİ	44,928	0,306	0,483	0,187	0,118	5,662
BURSA M.KEMALPAŞA DEVLET HASTANESİ	46,844	0,142	0,176	0,079	0,076	8,952
BURSA MUDANYA ŞAZİYE RÜŞTÜ DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
BURSA ORHANGAZİ DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
BURSA ŞEVKET YILMAZ DEVLET HASTANESİ	44,919	0,106	0,119	0,056	0,120	5,265
BURSA YENİŞEHİR DEVLET HASTANESİ	16,993	0,107	0,127	0,058	0,025	2,375
ÇANAKKALE AYVACIK DEVLET HASTANESİ	7,011	0,139	0,234	0,087	0,008	1,082
ÇANAKKALE BAYRAMİÇ DEVLET HASTANESİ	9,784	0,035	0,043	0,019	0,005	1,283
ÇANAKKALE BİGA DEVLET HASTANESİ	48,651	0,291	0,425	0,173	0,128	11,434
ÇANAKKALE ÇAN DEVLET HASTANESİ	28,171	0,273	0,376	0,158	0,069	7,789
ÇANAKKALE DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
ÇANAKKALE EZİNE DEVLET HASTANESİ	4,444	0,000	0,000	0,000	0,000	0,251
ÇANAKKALE GELİBOLU DEVLET HASTANESİ	11,106	0,151	0,188	0,084	0,021	1,388
ÇANKIRI ÇERKEŞ DEVLET HASTANESİ	5,911	0,234	0,316	0,135	0,013	1,479
ÇANKIRI DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
ÇORUM ALACA DEVLET HASTANESİ	0,000	0,036	0,037	0,018	0,006	0,655
ÇORUM BAYAT DEVLET HASTANESİ	10,825	0,440	0,846	0,293	0,039	3,143
ÇORUM DEVLET HASTANESİ	96,751	0,089	0,101	0,047	0,174	16,765
ÇORUM İSKİLİP DEVLET HASTANESİ	16,898	0,151	0,182	0,083	0,036	2,885
ÇORUM KARGI DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
ÇORUM MECİTÖZÜ DEVLET HASTANESİ	13,463	0,275	0,458	0,172	0,029	2,889
ÇORUM OSMANCIK DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
ÇORUM SUNGURLU DEVLET HASTANESİ	11,075	0,217	0,278	0,122	0,078	6,874
DENİZLİ ACIPAYAM DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
DENİZLİ BULDAN ARIF CERİT DEVLET HASTANESİ	11,848	0,516	1,067	0,348	0,073	4,512
DENİZLİ ÇARDAK DEVLET HASTANESİ	5,736	0,279	0,454	0,173	0,012	1,451
DENİZLİ ÇİVRİL DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
DENİZLİ DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
DENİZLİ HONAZ DEVLET HASTANESİ	10,630	0,365	0,574	0,223	0,030	2,703
DENİZLİ KALE DEVLET HASTANESİ	12,977	0,335	0,572	0,212	0,032	3,039
DENİZLİ SARAYKÖY DEVLET HASTANESİ	13,324	0,390	0,639	0,242	0,056	3,622
DENİZLİ SERVERGAZİ DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
DENİZLİ TAVAS DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
DIYARBAKIR BİSMİL DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
DIYARBAKIR ÇERMİK DEVLET HASTANESİ	9,919	0,244	0,322	0,139	0,052	2,982

DÜZCE AKÇAĞAÇ DEVLET HASTANESİ	22,762	0,367	0,607	0,229	0,077	7,726
DÜZCE ATATÜRK DEVLET HASTANESİ	38,335	0,188	0,231	0,104	0,237	13,988
EDİRNE DEVLET HASTANESİ	0,000	0,078	0,085	0,041	0,079	4,114
EDİRNE İPSALA DEVLET HASTANESİ	5,778	0,012	0,014	0,006	0,001	0,422
EDİRNE KEŞAN DEVLET HASTANESİ	8,409	0,000	0,000	0,000	0,000	0,717
EDİRNE UZUNKÖPRÜ DEVLET HASTANESİ	16,085	0,063	0,068	0,033	0,021	2,125
ELAZIĞ HARPUT DEVLET HASTANESİ	24,125	0,115	0,130	0,061	0,096	8,479
ELAZIĞ KOVANCILAR DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
ERZİNCAN DEVLET HASTANESİ	79,458	0,144	0,172	0,078	0,170	11,846
ERZURUM HORASAN DEVLET HASTANESİ	17,905	0,221	0,292	0,126	0,040	3,553
ERZURUM OLTU DEVLET HASTANESİ	4,461	0,092	0,102	0,048	0,033	2,314
ESKİŞEHİR ÇİFTELER DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
ESKİŞEHİR DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
ESKİŞEHİR SİVRİHİSAR DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
ESKİŞEHİR YUNUS EMRE DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
GİRESUN BULANCAK DEVLET HASTANESİ	41,261	0,367	0,610	0,229	0,111	9,368
GİRESUN DERELİ DEVLET HASTANESİ	10,679	0,323	0,489	0,194	0,030	2,271
GİRESUN PROF. DR. A. İLHAN ÖZDEMİR DEVLET HASTANESİ	184,871	0,313	0,476	0,189	0,387	24,867
GİRESUN Ş. KARAHİSAR DEVLET HASTANESİ	19,090	0,361	0,727	0,241	0,048	2,792
GİRESUN TİREBOLU DEVLET HASTANESİ	11,164	0,094	0,108	0,050	0,019	1,918
GÜMÜŞHANE DEVLET HASTANESİ	14,417	0,041	0,044	0,021	0,026	2,779
GÜMÜŞHANE KELKİT DEVLET HASTANESİ	10,112	0,291	0,411	0,170	0,057	3,796
HAKKARİ DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
HAKKARİ ŞEMDİNLİ DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
HAKKARİ YÜKSEKOVA DEVLET HASTANESİ	6,748	0,024	0,026	0,012	0,013	1,106
IĞDIR DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
IĞDIR TUZLUCA DEVLET HASTANESİ	22,043	0,000	1,141	0,000	0,000	2,441
İSTANBUL BAYRAMPAŞA DEVLET HASTANESİ	15,498	0,027	0,028	0,014	0,014	2,121
İSTANBUL BÜYÜKÇEKMECE DEVLET HASTANESİ	4,568	0,009	0,009	0,005	0,002	0,205
İSTANBUL ÇATALCA İLYAS ÇOKAY DEVLET HASTANESİ	4,297	0,006	0,006	0,003	0,001	0,154
İSTANBUL ESENYURT DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
İSTANBUL EYÜP DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
İSTANBUL KARTAL YAVUZ SELİM DEVLET HASTANESİ	48,337	0,020	0,022	0,010	0,031	7,125
İSTANBUL LÜTFİYE NURİ BURAT DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
İSTANBUL PAŞABAĞCI DEVLET HASTANESİ	46,020	0,157	0,187	0,086	0,209	21,428
İSTANBUL PENDİK DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
İSTANBUL SARIYER İSMAİL AKGÜN DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
İSTANBUL SARIYER İSTİNYE DEVLET HASTANESİ	32,481	0,114	0,132	0,061	0,065	3,251
İSTANBUL ÜSKÜDAR DEVLET HASTANESİ	0,000	0,039	0,041	0,020	0,032	6,592
İZMİR ALIĞA DEVLET HASTANESİ	11,484	0,207	0,260	0,115	0,071	9,058
İZMİR ALSANCAK NEVVAR SALİH İŞGÖREN DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000

İZMİR BAYINDIR DEVLET HASTANESİ	4,059	0,000	0,000	0,000	0,000	0,072
İZMİR BUCA SEYFİ DEMİRSOY DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
İZMİR ÇİĞLİ DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
İZMİR DR.FARUK İLKER BERGAMA DEVLET HASTANESİ	48,515	0,293	0,426	0,174	0,152	7,275
İZMİR FOÇA DEVLET HASTANESİ	12,316	0,279	0,445	0,171	0,032	1,988
İZMİR KARŞIYAKA DEVLET HASTANESİ	163,256	0,316	0,489	0,192	0,383	41,068
İZMİR KIRAZ DEVLET HASTANESİ	9,551	0,246	0,355	0,145	0,025	1,676
İZMİR M.ENVER ŞENERDEM TORBALI DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
İZMİR MENEMEN DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
İZMİR NEJAT HEPKON SEFERİHİSAR DEVLET HASTANESİ	13,485	0,152	0,180	0,082	0,035	5,204
İZMİR ÖDEMİŞ DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
İZMİR SELÇUK DEVLET HASTANESİ	20,207	0,182	0,225	0,101	0,037	7,116
İZMİR TİRE DR.ERTUĞRUL AKER DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
İZMİR URLA DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
KAHRAMANMARAŞ AFŞİN DEVLET HASTANESİ	0,000	0,029	0,030	0,015	0,012	0,879
KAHRAMANMARAŞ ANDIRIN DEVLET HASTANESİ	11,592	0,430	0,753	0,274	0,048	4,496
KAHRAMANMARAŞ DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
KAHRAMANMARAŞ DR.SÜREYYA ADANALI GÖKSUN DEVLET HASTANESİ	5,903	0,000	0,000	0,000	0,000	0,061
KAHRAMANMARAŞ ELBİSTAN DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
KAHRAMANMARAŞ PAZARCIK DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
KAHRAMANMARAŞ YENİŞEHİR DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
KARABÜK DEVLET HASTANESİ	39,484	0,031	0,033	0,016	0,034	3,023
KARABÜK SAFRANBOLU DEVLET HASTANESİ	33,303	0,328	0,499	0,198	0,082	8,415
KARAMAN DEVLET HASTANESİ	37,015	0,033	0,034	0,017	0,048	2,624
KARAMAN ERMENEK DEVLET HASTANESİ	12,216	0,173	0,216	0,096	0,026	1,697
KARS DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
KARS KAĞIZMAN DEVLET HASTANESİ	11,449	0,231	0,304	0,132	0,039	2,336
KARS SARIKAMIŞ DEVLET HASTANESİ	0,000	0,145	0,170	0,078	0,025	2,354
KASTAMONU BOZKURT DEVLET HASTANESİ	3,439	0,000	0,000	0,000	0,000	0,144
KASTAMONU CİDE DEVLET HASTANESİ	6,450	0,241	0,330	0,140	0,017	1,813
KASTAMONU DADAY DEVLET HASTANESİ	5,563	0,471	0,979	0,323	0,021	3,349
KASTAMONU DR.MÜNİF İSLAMOĞLU DEVLET HASTANESİ	121,849	0,257	0,384	0,154	0,236	24,045
KASTAMONU İNEBOLU DEVLET HASTANESİ	12,824	0,334	0,535	0,206	0,037	4,868
KASTAMONU TAŞKÖPRÜ DEVLET HASTANESİ	13,945	0,285	0,438	0,173	0,033	3,848
KAYSERİ BÜNYAN DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
KAYSERİ DEVELİ HATİCE-MUAMMER KOCATÜRK DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
KAYSERİ YAHYALI DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
KIRIKKALE DEVLET HASTANESİ	47,529	0,134	0,159	0,073	0,066	7,207
KIRKLARELİ BABAESKİ DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
KIRKLARELİ DEVLET HASTANESİ	70,316	0,319	0,472	0,191	0,258	24,321
KIRKLARELİ VİZE DEVLET HASTANESİ	9,507	0,092	0,114	0,051	0,010	0,978

KIRŞEHİR DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
KIRŞEHİR KAMAN DEVLET HASTANESİ	10,461	0,225	0,292	0,127	0,030	6,052
KOCAELİ DARICA FARABİ DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
KOCAELİ DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
KOCAELİ GEBZE FATİH DEVLET HASTANESİ	12,159	0,000	0,000	0,000	0,000	0,022
KOCAELİ GÖLCÜK DEVLET HASTANESİ	33,113	0,084	0,095	0,045	0,063	4,898
KOCAELİ KANDIRA KAZIM DİNÇ DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
KOCAELİ KARAMÜRSEL DEVLET HASTANESİ	18,823	0,159	0,201	0,089	0,040	3,785
KOCAELİ KÖRFEZ DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
KONYA AKŞEHİR DEVLET HASTANESİ	24,201	0,155	0,184	0,084	0,110	10,865
KONYA BEYŞEHİR DEVLET HASTANESİ	50,460	0,245	0,331	0,141	0,131	11,790
KONYA CİHANBEYLİ DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
KONYA ÇUMRA DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
KONYA DOĞANHİSAR DEVLET HASTANESİ	7,958	0,135	0,215	0,083	0,009	2,071
KONYA EREĞLİ DEVLET HASTANESİ	34,192	0,102	0,116	0,054	0,075	4,971
KONYA HÜYÜK DEVLET HASTANESİ	7,612	0,054	0,067	0,030	0,005	0,688
KONYA KADINHANI REFİK-SAİME KOYUNCU DEVLET HASTANESİ	17,655	0,483	0,952	0,321	0,065	4,423
KONYA KARAPINAR DEVLET HASTANESİ	12,090	0,216	0,275	0,121	0,028	2,866
KONYA NUMUNE HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
KONYA SEYDİŞEHİR DEVLET HASTANESİ	14,452	0,093	0,103	0,049	0,039	4,794
KÜTAHYA DEVLET HASTANESİ	110,772	0,277	0,395	0,163	0,267	17,680
KÜTAHYA DOÇ.DR.İSMAIL KARAKUYU SİMAV DEVLET HASTANESİ	7,156	0,018	0,019	0,009	0,006	0,411
KÜTAHYA DOÇ.DR.MUSTAFA KALEMLİ TAVŞANLI DEVLET HASTANESİ	19,513	0,026	0,028	0,013	0,016	1,788
KÜTAHYA EMET DEVLET HASTANESİ	5,845	0,091	0,111	0,050	0,009	0,924
KÜTAHYA EVLİYA ÇELEBİ DEVLET HASTANESİ	43,981	0,076	0,087	0,041	0,081	5,390
KÜTAHYA GEDİZ DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
MALATYA DEVLET HASTANESİ	0,000	0,086	0,094	0,045	0,250	20,150
MALATYA DOĞANŞEHİR DEVLET HASTANESİ	9,404	0,256	0,345	0,147	0,027	4,552
MALATYA YEŞİLYURT HASAN ÇALIK DEVLET HASTANESİ	3,062	0,083	0,090	0,043	0,009	0,504
MANİSA AKHİSAR DEVLET HASTANESİ	24,120	0,045	0,050	0,024	0,039	4,293
MANİSA ALAŞEHİR DEVLET HASTANESİ	34,220	0,101	0,114	0,054	0,042	3,485
MANİSA DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
MANİSA KIRKAĞAÇ DEVLET HASTANESİ	20,265	0,489	1,078	0,337	0,053	3,237
MANİSA KULA DEVLET HASTANESİ	3,626	0,040	0,043	0,021	0,006	0,286
MANİSA MERKEZEFENDİ DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
MANİSA SALİHLİ DEVLET HASTANESİ	33,157	0,092	0,104	0,049	0,069	8,244
MANİSA SARIGÖL DEVLET HASTANESİ	6,143	0,149	0,176	0,081	0,014	1,104
MANİSA SARUHANLI DEVLET HASTANESİ	0,000	0,046	0,049	0,024	0,010	1,036
MANİSA SOMA DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
MANİSA TURGUTLU DEVLET HASTANESİ	15,344	0,014	0,014	0,007	0,011	0,785
MARDİN DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000

MARDİN KIZILTEPE DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
MARDİN MİDYAT DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
MARDİN NUSAYBİN DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
MUĞLA BODRUM DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
MUĞLA DALAMAN DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
MUĞLA DEVLET HASTANESİ	100,616	0,235	0,316	0,135	0,269	12,486
MUĞLA FETHİYE DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
MUĞLA KÖYCEĞİZ DEVLET HASTANESİ	12,028	0,161	0,200	0,089	0,022	2,291
MUĞLA MARMARİS DEVLET HASTANESİ	30,598	0,223	0,297	0,128	0,078	7,507
MUĞLA MİLAS 75.YIL DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
MUĞLA ORTACA DEVLET HASTANESİ	12,731	0,195	0,243	0,108	0,032	4,098
MUŞ BULANIK DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
MUŞ DEVLET HASTANESİ	47,854	0,221	0,285	0,125	0,199	10,798
MUŞ HASKÖY DEVLET HASTANESİ	10,235	0,187	0,341	0,124	0,014	0,993
MUŞ MALAZGİRT DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
MUŞ VARTO DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
NEVŞEHİR DR.İ.ŞEVKİ ATASAGUN DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
NEVŞEHİR ÜRGÜP DEVLET HASTANESİ	16,420	0,487	0,954	0,323	0,075	13,583
NİĞDE BOR DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
NİĞDE DEVLET HASTANESİ	112,374	0,297	0,433	0,176	0,326	29,411
ORDU AKKUŞ DEVLET HASTANESİ	4,706	0,190	0,250	0,109	0,010	0,974
ORDU AYBASTI DEVLET HASTANESİ	15,480	0,242	0,335	0,140	0,033	2,488
ORDU BOZTEPE DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
ORDU DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
ORDU FATSA DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
ORDU KUMRU DEVLET HASTANESİ	15,721	0,163	0,259	0,100	0,022	2,908
ORDU ÜNYE DEVLET HASTANESİ	26,818	0,072	0,081	0,038	0,053	5,564
OSMANİYE BAHÇE DEVLET HASTANESİ	15,803	0,442	0,822	0,288	0,051	4,458
SAKARYA AKYAZI DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
SAKARYA GEYVE DEVLET HASTANESİ	5,390	0,003	0,004	0,002	0,000	0,853
SAKARYA HENDEK DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
SAKARYA KARASU DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
SAKARYA PAMUKOVA DEVLET HASTANESİ	10,381	0,310	0,448	0,183	0,026	2,547
SAKARYA YENİKENT DEVLET HASTANESİ	74,945	0,092	0,107	0,049	0,088	6,649
SAMSUN ALAÇAM DEVLET HASTANESİ	7,011	0,113	0,139	0,062	0,009	1,167
SAMSUN BAFRA NAFİZ KURT DEVLET HASTANESİ	20,541	0,148	0,174	0,080	0,108	9,497
SAMSUN ÇARŞAMBA DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
SAMSUN GAZİ DEVLET HASTANESİ	75,671	0,137	0,158	0,073	0,193	11,544
SAMSUN HAVZA DEVLET HASTANESİ	11,771	0,053	0,059	0,028	0,012	1,501
SAMSUN KAVAK DEVLET HASTANESİ	14,060	0,273	0,501	0,177	0,032	3,724
SAMSUN LADİK DEVLET HASTANESİ	10,948	0,377	0,666	0,241	0,035	2,167

SAMSUN TERME DEVLET HASTANESİ	25,772	0,324	0,480	0,193	0,101	7,852
SAMSUN VEZİRKÖPRÜ DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
SİVAS DEVLET HASTANESİ	0,000	0,038	0,039	0,019	0,046	2,137
SİVAS DİVRİĞİ DEVLET HASTANESİ	13,668	0,221	0,328	0,132	0,025	2,606
SİVAS GÜRÜN DEVLET HASTANESİ	6,328	0,325	0,485	0,195	0,019	2,664
SİVAS NUMUNE HASTANESİ	0,000	0,201	0,251	0,112	0,326	24,304
SİVAS SUŞEHİRİ DEVLET HASTANESİ	5,779	0,000	0,000	0,000	0,000	0,046
SİVAS ŞARKIŞLA DEVLET HASTANESİ	16,028	0,228	0,296	0,129	0,039	4,536
SİVAS YILDIZELİ DEVLET HASTANESİ	5,759	0,147	0,172	0,079	0,019	1,864
SİVAS ZARA DEVLET HASTANESİ	9,229	0,177	0,222	0,099	0,023	1,779
ŞANLIURFA BALIKLIGÖL DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
ŞANLIURFA BİRECİK DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
ŞANLIURFA CEYLANPINAR DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
ŞANLIURFA HARRAN DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
ŞANLIURFA VİRANŞEHİR DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
TEKİRDAĞ ÇERKEZKÖY DEVLET HASTANESİ	15,343	0,025	0,027	0,013	0,010	0,664
TEKİRDAĞ ÇORLU DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
TEKİRDAĞ DEVLET HASTANESİ	96,561	0,176	0,218	0,097	0,250	21,892
TEKİRDAĞ HAYRABOLU DEVLET HASTANESİ	16,485	0,297	0,492	0,185	0,040	3,739
TEKİRDAĞ MALKARA DEVLET HASTANESİ	4,368	0,123	0,140	0,066	0,024	1,535
TEKİRDAĞ SARAY DEVLET HASTANESİ	22,728	0,283	0,461	0,175	0,046	5,104
TRABZON AKÇAABAT DEVLET HASTANESİ	19,722	0,073	0,079	0,038	0,030	3,095
TRABZON ARAKLı BAYRAM HALİL DEVLET HASTANESİ	13,567	0,154	0,199	0,087	0,028	1,941
TRABZON FATİH DEVLET HASTANESİ	45,225	0,086	0,098	0,046	0,080	4,313
TRABZON MAÇKA MEHMET AKTÜRK DEVLET HASTANESİ	7,700	0,134	0,184	0,078	0,010	1,135
TRABZON OF DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
TRABZON SÜRMENE DEVLET HASTANESİ	8,262	0,133	0,154	0,072	0,026	1,094
TRABZON TONYA DEVLET HASTANESİ	7,246	0,094	0,149	0,058	0,005	1,260
TRABZON VAKFIKEBİR DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
TUNCELİ DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
UŞAK BANAZ DEVLET HASTANESİ	5,667	0,039	0,041	0,020	0,005	0,581
UŞAK DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
UŞAK EŞME DEVLET HASTANESİ	3,005	0,063	0,067	0,032	0,006	0,442
UŞAK SİVASLI DEVLET HASTANESİ	7,268	0,215	0,282	0,122	0,023	0,912
VAN BAŞKALE DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
VAN ERCİŞ DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
VAN İPEKYOLU DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
VAN MURADIYE DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
VAN ÖZALP DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
YALOVA DEVLET HASTANESİ	24,907	0,032	0,034	0,016	0,028	7,944
YOZGAT AKDAĞMADENİ DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000

YOZGAT DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000
YOZGAT SORGUN DEVLET HASTANESİ	58,014	0,240	0,324	0,138	0,136	13,714
YOZGAT YERKÖY DEVLET HASTANESİ	13,221	0,191	0,236	0,105	0,054	6,302
ZONGULDAK ATATÜRK DEVLET HASTANESİ	197,704	0,277	0,393	0,163	0,455	36,508
ZONGULDAK ÇAYCUMA DEVLET HASTANESİ	10,568	0,010	0,011	0,005	0,004	0,702
ZONGULDAK DEVLET HASTANESİ	78,790	0,615	1,643	0,451	0,337	26,086
ZONGULDAK DEVREK DEVLET HASTANESİ	25,995	0,340	0,569	0,213	0,059	5,515
ZONGULDAK KARADENİZ EREĞLİ DEVLET HASTANESİ	0,000	0,000	0,000	0,000	0,000	0,000



Resume

Education

- PhD** Marmara University, Industrial Engineering August 2022
Dissertation: “Assessing The Quality Of Care In Turkish Hospitals:A Dea Approach”
Advisor: Prof. Dr. Nurhan Davutyan
- MA** Marmara University, Economics March 2010
Thesis: “Efficiency of state-owned general hospitals in Turkey”
Advisor: Prof. Dr. Ali Suut Doğruel
- BS** University of Michigan, Electrical Engineering April 2003
Minor in Economics

Work Experience

- Marmara University Department of Industrial Engineering, Teaching Assistant** Since 2008
- Turkish Naval Forces** 2007 to 2008
Engineering Officer: Sub-lieutenant (OF-1)
- Marmara University Department of Industrial Engineering, Teaching Assistant** 2005 to 2007

Teaching Experience

- Marmara University, Istanbul** Jan 2005 to Nov 2007 and since Dec 2008
Teaching Assistant, Industrial Engineering
Courses:

- CSE1141: Computer Programming for Industrial Engineering
- CSE1142: Intermediate Programming for Industrial Engineering
- IE2151: Probability for Industrial Engineers
- IE2152: Statistics for Industrial Engineers
- IE3033/IE3034: Operations Research I-II
- IE3064: Introduction to Simulation
- IE4036: Project Management
- PHYS1103/ PHYS1104: Physics Lab I-II

Publications

Books

Fırat, S.Ü., Yurtsever, Ö. and Bilsel, M., Taşıtlarda Enerji Verimliliği, İstanbul: İş Dünyası ve Sürdürülebilir Kalkınma Derneği, 2015

Book Chapters

Davutyan, N. and M. Bilsel., “Efficiency of Turkish provincial general hospitals with mortality as undesirable output” In I.H. Osman, A.L. Anouze and A. Emrouznejad (Eds.), Handbook of research on strategic performance management and measurement using data envelopment analysis. Hershey: IGI Global. 2014 pp: 426-436

Journal Publications

Davutyan, N., Bilsel, M. and Tarcan M., “Migration, risk-adjusted mortality, varieties of congestion and patient satisfaction in Turkish provincial general hospitals” Data Envelopment Analysis Journal, vol. 1, no. 2, 2015, pp. 135-169

Bilsel, M. and Davutyan, N., “Hospital efficiency with risk adjusted mortality as undesirable output: the Turkish case,” Annals of Operations Research, vol. 221, no. 1, 2014, pp. 73-88.

Bilsel, M., Ayhan, M. B. and Bulkan, S., “Shelf space optimization using metaheuristic algorithms,” Business and Management, vol. 5, no. 2, 2013, pp. 210-217.

Conference Papers

Fırat S. Ü. , Yurtsever Ö. and Bilsel M., “Türkiye de Kara Taşıtlarının Çevresel Sürdürülebilirlik Açısından İstatistik Analizi” X. Endüstri İşletme Mühendisliği Kurultayı, İstanbul, Turkey, Dec. 25-26, 2015

Bilsel, M. and Davutyan, N, “Hospital Efficiency with Endogenously Determined Direction Vectors,” 13th International Conference On Data Envelopment Analysis, Braunschweig, Germany, Aug. 24-28, 2015

Bilsel, M., Özel, S. and Vayvay, Ö., “Responsive Supply Chain and an Analysis on Manufacturing Industry,” International Conference on Value Chain Sustainability ICOVACS, İstanbul, Turkey, Mar. 12-13, 2015

Bilsel, M. and Fırat, S.Ü., “Türk Sağlık Sistemindeki Gelişmelerin Sürdürülebilirliği” ÜAS'13 - 13. Üretim Araştırmaları Sempozyumu, Sakarya, Turkey, Sept. 25-27, 2013, Vol.1 pp. 476-481.

Bilsel M. , Ersoy E. and Fırat S. Ü. “Kümeleme tekniklerine Kısa Bir Bakış ve Türkiye Turizm Kümeleri İçin Bir Uygulama,” YAEM 31. Ulusal Kongresi, Sakarya, Turkey, Jul. 05-07, 2011

Bilsel, M., Ayhan, M. B. and Bulkan, S., “Shelf space optimization using metaheuristic algorithms,” 12th International Symposium on Econometrics, Statistics, and Operations Research, Denizli, Turkey, May. 26-29, 2011

Bilsel, M. “Türkiye’deki Genel Devlet Hastanelerinin Verimliliği,” YAEM 30. Ulusal Kongresi, İstanbul, Turkey, Jun. 30-Jul 02, 2010

Languages

Turkish: Native Language

English: Proficient

German: Proficient

Italian: Elementary

Computer Skills

Programming: Python, Java, C++

Tools: Lingo, R, MATLAB

Other

Personal interests: Endurance Sports (Running & Cycling)

- Marathon Personal Best: 4:28:17
- Half-Marathon Personal Best: 1:57:18