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RESEARCH ARTICLE

ASSESSMENT OF TÜRKİYE'S PROVINCES WITH HEALTH INFRASTRUCTURE INDICATORS USING DESCRIPTIVE ANALYSIS AND HEALTH INDEX

Ahmet Bahadır ŞİMŞEK *

ABSTRACT

Health systems assessment is critical to ensure the sustainability of health services. The interest of researchers in analysing health systems, which intensified during the pandemic, is motivated by the opportunity to identify weaknesses and propose changes. Health systems analyses provide valuable feedback for policy makers, especially in developing countries, which struggle with obstacles such as limited resources, financial constraints and deficiencies in health infrastructure. As a developing country, Türkiye has been striving to ensure equal access to health services through its health transformation programme. In the last decade, developments such as the increase in Syrian migrants and economic contraction have negatively affected this effort. This situation motivates the need to analyse the current situation in the Turkish health system and provide suggestions for improvement. The literature on the Turkish health system mostly focuses on broad health system indicators such as health service accessibility, efficiency, quality and user satisfaction. This study focuses on assessing the accessibility of health infrastructure resources. In the study, health infrastructure indicators related to the Turkish health system are evaluated on a province basis for the period from 2012 to 2021. The evaluation is based on the descriptive statistics of the dataset and the province-based health index. The findings show changing trends and gaps in access to health services with the increase in population in the period 2012-2021. Some variables (e.g. population per hospital and population per bed) show low variances, while others (e.g. population per intensive care bed) show large differences. These differences may indicate unequal development and investment in health infrastructure. For policy makers, they emphasise the need to develop policies to address these inequalities and to distribute resources equitably. Analysing the health index values shows inequalities in access to health resources in different provinces of Türkiye as a score. In particular, while some provinces such as Isparta and Bolu stand out with consistently high index scores, lower index scores in other provinces such as Şanlıurfa, Mardin, Ağrı and Şırnak indicate that inequalities in access to health services are faced. This index identifies changes and gaps in the distribution of health resources and shows policy makers priority areas for intervention.

Keywords: *Health Policy, Health Infrastructure, Health Index Score*

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* *Assist. Prof., Gümüşhane University, Faculty of Health Sciences, Department of Health Management, abahadirsimsek@gumushane.edu.tr*

https://orcid.org/0000-0002-7276-2376

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ARAŞTIRMA MAKALESİ

TANIMLAYICI ANALİZ VE SAĞLIK İNDEKSİ İLE TÜRKİYE'DEKİ İLLERİN SAĞLIK ALTYAPI GÖSTERGELERİYLE DEĞERLENDİRİLMESİ

Ahmet Bahadır ŞİMŞEK *

ÖZ

Sağlık hizmetlerinin sürdürülebilirliğini sağlamak için sağlık sistemlerinin değerlendirilmesi kritiktir. Araştırmacıların sağlık sistemlerini analiz etmeye yönelik pandemi döneminde yoğunlaşan ilgisi zayıf noktaları belirleyerek değişiklikler önerme fırsatından motive olmaktadır. Özellikle sınırlı kaynaklar, mali kısıtlamalar ve sağlık altyapısındaki eksiklikler gibi engellerle boğuşan gelişmekte olan ülkelerde sağlık sistemlerinin analizi politika yapıcılar için değerli geri bildirim sağlamaktadır. Gelişmekte olan bir ülke olan Türkiye sağlıkta dönüşüm programı ile sağlık hizmetlerine eşit erişim sağlama çabası içerisindedir. Son on yılda Suriyeli göçmenlerin artışı ve ekonomik daralma gibi gelişmeler bu çabayı olumsuz etkilemektedir. Bu durum Türk sağlık sisteminde mevcut durumu analiz etme ve iyileştirme önerileri sunma ihtiyacını motive etmektedir. Türk sağlık sistemini ele alan literatür çoğunlukla sağlık hizmetine erişilebilirlik, verimlilik, kalite ve kullanıcı memnuniyeti gibi geniş sağlık sistemi göstergelerine odaklanmaktadır. Bu çalışma, sağlık altyapı kaynaklarının erişilebilirliğini değerlendirmeye odaklanmaktadır. Çalışmada Türkiye'nin sağlık sistemine ilişkin sağlık altyapı göstergeleri 2012'den 2021'e kadar olan dönemde il bazında değerlendirilmiştir. Değerlendirme veri setinin tanımlayıcı istatistikleri ve il bazlı hesaplanan sağlık endeksi üzerinden gerçekleştirilmiştir. Bulgular, 2012-2021 döneminde nüfusun artmasıyla birlikte sağlık hizmetlerine erişimdeki değişen eğilimleri ve boşlukları göstermektedir. Bazı değişkenlerde (örneğin, hastane başına nüfus ve yatak başına nüfus) düşük varyanslar gözlemlenirken, diğerleri (örneğin, yoğun bakım yatağı başına nüfus) büyük farklılıklar göstermektedir. Bu farklılıklar, sağlık altyapısında eşitsiz gelişimi ve yatırımı işaret eder. Politika yapıcılar için, bu eşitsizliklerin giderilmesine ve kaynakların adil bir şekilde dağıtılmasına yönelik politika geliştirme ihtiyacını vurgular. Sağlık indeksi değerlerinin incelenmesi, Türkiye'nin farklı illerinde sağlık kaynaklarına erişimdeki eşitsizlikleri skor olarak göstermektedir. Özellikle, Isparta ve Bolu gibi bazı iller sürekli yüksek indeks skorlarıyla dikkat çekerken, Şanlıurfa, Mardin, Ağrı ve Şırnak gibi diğer illerdeki daha düşük indeks puanları sağlık hizmetlerine erişimde eşitsizliklerin yaşandığını göstermektedir. Bu indeks, sağlık kaynaklarının dağılımındaki değişiklikleri ve eksiklikleri belirlemekte ve politika yapıcılarına müdahale için öncelikli bölgeleri göstermektedir.

Anahtar Kelimeler: *Sağlık Politikası, Sağlık Altyapısı, Sağlık İndeksi Puanı*

MAKALE HAKKINDA

* *Dr. Öğr. Üyesi, Gümüşhane Üniversitesi, Sağlık Bilimleri Fakültesi, Sağlık Yönetimi Bölümü, abahadirsimsek@gumushane.edu.tr*

https://orcid.org/0000-0002-7276-2376

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I. INTRODUCTION

Assessment of health systems and determine weaknesses is a key task to ensure the sustainability of health services. Health systems research, in other words, pinpointing areas of weakness and proposing the most suitable ways of improvement, is one of the research areas that concern both researchers and policy makers. The motivation and attention for research on health systems can be illustrated with evidence from the literature as follows. Health systems research has become a focal point for researchers since the onset of the Covid-19 pandemic, which has caused more than 7 million deaths (WHO, 2022) and economic losses totalling approximately $16 trillion (Cutler & Summers, 2020). The Covid-19 pandemic was a stress test of countries' health policies and systems (Sundararaman et al., 2021; Tressel & Ding, 2021), both challenging the health systems of the developed countries, which are already established, and pushing developing countries' weak health systems into a state of complete stagnation (WB & WHO, 2021). This crisis has been a catalyst for scholars to undertake a thorough health systems analysis to pinpoint weaknesses and recommend changes (Lee & Lee, 2020; Levin-Zamir et al., 2021; Marcassoli et al., 2023). The overall outcome of pandemic-driven studies comes down to the need for the improvement of health policy and system responsiveness by focusing on flexibility and timeliness, promoting inter-organizational collaboration and information exchange, and integrating digital technologies. Even before the pandemic, the assessment of health systems was a topic that received a great deal of attention among researchers. Groenewegen (2013) carried out a thorough research meant to understand the variations in health systems across Europe and provide the policymakers with useful information that could be utilized to improve the health policies. In a detail way, Lee et al. (2017) analysed the development of the health system in Korea including socio-political factors. Their intensive research aimed at revealing the origin and mechanism of the system that caused these policy changes in Korea, and thereby helps to enhance the understanding of health policy changes in Korea. These studies demonstrate the power of health systems analysis in providing decisive information for health policy formulation.

An important role of health systems assessment is to provide feedback to policy makers in developing countries. Kruk & Freedman (2008) highlight that the health systems in these countries encounter various obstacles including limited resources, financial constraints, disparities, a focus on curative rather than preventive care, insufficient workforce, and inadequate healthcare infrastructure. Türkiye, being a developing country, encounters similar challenges in its healthcare system. The reform trajectory and evolution of Türkiye's healthcare system exemplify a concerted endeavour to progressively surmount these obstacles. Oguz (2020) summarizes the evolution and milestones of the Turkish health system, which has undergone significant transformations over time, as follows. Historically, until the 1980s, the government assumed a prominent role in delivering healthcare services. However, starting from 2002, there has been a noteworthy surge in the involvement of the private sector, primarily driven by the implementation of neoliberal economic policies. The quantitative development in healthcare provision is evident in the available data on the number of health institutions, life expectancy, infant mortality rates, and state budget allocation. The Turkish health policies can be categorized into five distinct periods: (a) the pre-republic period (1900s-1920); (b) the early years of the Turkish Republic (1920-1950); (c) the Democrat Party period (1951-1960); (d) the Social Welfare period (1961-1980); and (e) the transition to neoliberalism period (1980-present). Since the 1980s, the implementation of neoliberal economic policies has resulted in significant changes in Turkish health policies. Notably, the share of the private sector in healthcare provision has experienced a substantial increase since 2002. Key milestones during this period include the introduction of the Health Transformation Program (HTP) in 2003, aimed at enhancing healthcare access and reducing out-of-pocket expenses. Additionally, the establishment of a universal health coverage system in 2012 aimed to ensure equal access to healthcare services for all citizens.

The aim of ensuring equal access to health services is key to this research. Because this aim shows that the deficiency is realised and that there are efforts to overcome this deficiency. There have been subsequent developments in the following years that have adversely affected these efforts. Some of these can be summarized as follows. The influx of Syrian migrants seeking refuge from the Syrian civil war into Türkiye's border regions has resulted in unplanned population growth. The number of Syrians under

temporary protection has risen from 14,237 in 2012 to 3,737,369 in 2021 (Presidency of Migration Management, 2023). Moreover, disparities have emerged within the concentrated migrant population in terms of language, cultural beliefs and traditions, health awareness, and education. Another significant development is the economic contraction, with the gross domestic product per capita declining from $11,289 in 2012 to $9,592 in 2021 (TURKSTAT, 2023). This 17% decrease in GDP per capita hinders the access to health services, particularly for low-income individuals. These developments and more, underscore the need for a comprehensive situation analysis to derive valuable insights for the enhancement of the Turkish health system.

The principal objective of this research is to scrutinize health indicators on a provincial scale, thereby evaluating the availability of healthcare infrastructure resources within the Turkish healthcare framework spanning from 2012 to 2021. To this end, a descriptive statistical analysis is deployed to examine the performance of provinces based on indicators. The overall landscape is assessed through the computation of a health index. The literature review conducted in Section 2 regarding the analysis of the Turkish health system demonstrates the significance of the subject matter and the keen interest of researchers. The majority of these studies concentrate on broad health system indicators such as health service accessibility, efficiency, quality, and user satisfaction. This current study distinguishes itself from others by focusing on the evaluation of the accessibility of health infrastructure resources. By assessing the accessibility of health infrastructure resources, it aims to provide a more precise examination of the physical assets of the health infrastructure and their distribution among the population. This approach furnishes invaluable insights for policymakers, affording them the opportunity to ensure equitability and impartiality in healthcare service access. It aids in the optimization of health system planning, bolstering efficiency and effectiveness, enabling targeted interventions, and fostering the formulation of prospective healthcare strategies.

The motivation for focusing this study on provinces and using a health index based on health indicators and their descriptive statistics in the methodology adopted can be explained as follows. As health systems are systematised by health policies, the dynamics that set health policies are important. One of them is regional differences. According to Fleurbaey and Schokkaert (2009), there exists a strong link between health inequalities and regional differences, and, therefore, this implies that the delivery of healthcare services is regionally determined hence resulting in standardization difficulty. This is also reflected by the numerous research from different angles conducted by (Liu et al., 2020; Mangano, 2010; Wulandari et al., 2023). Hence, policymakers should pay attention and evaluate the quality of healthcare in regions. This can help to identify the variations among them and use them to create effective health care policies. Monitoring of health indicators can be used for this end. The fact that health indicators have been in place for a long time in academic research, attests to their reliability as robust tools for health system monitoring (Elola et al., 1995; Fagnani & Dumenil, 1976; Farajzadegan et al., 2007; Hafeez et al., 2023). Scientifically designed health indicators consist of such quantitative measures that enable comparisons to be made between different times, revealing insights for policy making, planning and monitoring (Currie & Seddon, 2014). Descriptive statistical analysis of health indicators is a useful and easily applicable way of identifying the trends and determining the current situation while developing health policies. On the other hand, the multitude of indicators that exist to compute and report health metrics (see WHO Health Indicators) is a major challenge that the decision-makers face, who not only have to understand the complex relationships among these indicators but also have to make comprehensive inferences about the healthcare system. To address this challenge, the practical, rational, and commonly adopted approach involves utilizing health indices; it combines multiple health indicators (Kaltenthaler et al., 2004; Li et al., 2023; Rothenberg et al., 2015). While every single indicator measures a separate aspect of the health system, health index comprises these various dimensions simultaneously by considering them all together. They allow for cross-system comparisons, thus empowering decision-makers to make the best choices and enabling the general public to have better health services understanding.

The rest of the paper is organized as follows. Section 2 discusses related research. Section 3 provides information on the data and methodology used in the study. Section 4 presents and interprets the findings. Conclusions is given in Section 5.

II. RELATED RESEARCHES

2.1. Researches Focusing on Türkiye's Health System Evolution and Equity

Being a developing country, Turkish Health System has been going through structural reforms over time and has been indicating a gradual rise trend. The development of it has been examined from different viewpoints (Akinci et al., 2012; Büken, 2009; Tatar et al., 2011). Dündar & Özdemir (2012) studied the health problems in Türkiye over the past and the present and how the system works. For example, the Ministry of Health structure and functions, health insurance, and health services of Türkiye were discussed. Ali Jadoo et al. (2014) studied the public attitude in Türkiye regarding health policy reforms in Türkiye. The results show that the majority of the population considers the reforms to the health system as beneficial. The study revealed positive implications on accessibility, increased health resources, better quality of care and good attitudes of politicians/mass media. Mollahaliloglu et al. (2018) investigated the HTP influence on the health system. The findings demonstrate that HTP is an effective tool to improve the efficiency of general hospitals. Bener et al (2019) investigated the quality of health services in Türkiye. They underlined that Türkiye has increased its health level significantly and that the HTP is the reason of this increase. Oğuz (2020) analysed health policies in Türkiye from 1900 to 2015 and stated that while a quantitative development was observed in health service provision, a change emerged in which the share of the private sector increased with the widespread implementation of neoliberal economic policies, especially since 2002.

When the mentioned studies are linked to each other, it can be said that the Turkish health system has made significant progress in recent years and has shown a positive momentum in general. Improvements have been made in access to health services, efficiency, and quality. It is observed that the citizens are generally satisfied with the health system reforms and prefer the current system. However, changes such as the increasing role of the private sector in health services and public-private partnerships have been effective in the delivery of health services. The literature review reveals a lack of evaluation of efforts to ensure equal access to health services for all citizens, one of the goals that emerged in the Turkish health system in 2012. This research aims to fill this gap in the literature with its potential to reflect a multitude of positive effects such as increasing public awareness of the health system, supporting policymakers' decisions and identifying steps to be taken towards providing a more equitable health service.

2.2. Researches Focusing on Healthcare Accessibility

Nowadays, the problem of providing equal access to healthcare and evaluation of its consequences for healthcare system administrators, policymakers, and researchers of different countries has turned to be of a great significance. In this sense, multiple studies carried out in various countries to evaluate the availability, accessibility and fairness of healthcare infrastructures have been developed.

In India, the research done by Taqi et al (2017) focused on comparing the situation on accessibility to healthcare services in rural regions and in urban areas. The survey looked into the presence of physical infrastructure and manpower using the National Rural Health Mission (NRHM) data across different tiers of health centres. The study showed that there were colossal disparities in the parameters among different states in India. However, some states constructed more infrastructure than required, while others failed to build enough or had to alter their infrastructure. The study at the same time has been stressing on the advances made by NRHM in rural physical infrastructural improvement and the problems encountered in proper implementation.

In Iran, Javad et al. (2015) examined the degree of comprehensiveness of healthcare infrastructure in the cities of Alborz province. The evaluation of the cities was done through the use of indicators such as health centres, clinics, and emergency departments, and they were ranked in terms of how near they are to health care infrastructure. The research has proved that the accessibility of health infrastructure in the developed and underdeveloped cities is highly variable. Interestingly, the distribution of health

infrastructure was not just population density-based, giving another dimension to the issue of the multi-faceted access to healthcare, which is not only dependent on the population density.

South Korea was the subject of the study by Chen et al. (2023) which analysed the influence of population distribution, health facilities resources and transport infrastructure on healthcare accessibility. The study was performed by the 2-step floating catchment area method to estimate the accessibility of health care facilities according to the spatial location. Data demonstrated that the areas with a high population density, good hospitals' resources and transport system were the illustrations of high healthcare accessibility. Above all, this study identified the gap in infrastructure planning and management in healthcare delivery sector and the need of having an equal access to these services.

Indonesia was the focus of the study done by Puspitasari and Bulan (2021) on the correlation between healthcare infrastructure access and maternal healthcare use. The investigation employed multilevel logistic regression with IDHS data. It aimed to establish whether healthcare infrastructure was associated with maternal health services. The result stressed that the location of the area was an issue of the use of maternal health services. The availability of the nearest hospital seems to be the most important factor for people to use our services. This stresses the need for keeping the distances short so that people can be offered equal access to maternal healthcare services.

In Canada, Nguyen et al. (2020) speak about the barriers that Indigenous people experience when trying to access healthcare and how to remedy that. Researchers in a systematic review of comprehensive literature classified barriers into three groups at the proximal, intermediate, and distal levels. This survey led to the realisation that the complexity of the problems is greater than previously thought. Geographical barriers, inadequate education for Indigenous people, colonisation and social exclusion are the main obstacles to Indigenous access to health. The strategies that were highlighted in the report, including enhanced communication, capacity building, and community involvement, were proposed to solve the disparities and improve the quality of healthcare.

Orkin's (2020) study emphasis was to increase the healthcare access for the population that has been incarcerated in Ontario. Research brought to light the worsened health of the incarcerated and called for better healthcare coordination both during and after imprisonment. The information gained will be of great value for healthcare providers and policymakers.

The Czech Republic is also discussed by Šídlo and Maláková (2022) who examine the spatial healthcare accessibility. They focus on the regional differences in healthcare provision. The specific data was taken at the district level and aggregated individual data for the purpose of emphasizing the role of spatial accessibility in the process of health disparities mapping and intervention within the region.

Certainly, these studies bring forth the complex picture of healthcare access disparities relative to different national settings. By devoting detailed studies in India, Iran, South Korea, Indonesia, Canada, Czech Republic, and Ontario, these papers conclude that in addition to the availability and accessibility of equitable healthcare infrastructure, the most important factor is the critical nature of both. It is true that the magnitudes of the challenges differ from one country to another but a number of concerns are common among all countries. This calls for coordinated efforts from political leaders and healthcare stakeholders.

In view of the multiple geographical and demographic differences existing within Türkiye's provinces, localized research concentrating on the abundance and accessibility of healthcare infrastructure resources becomes a top priority. As in studies conducted in other countries, analysing the distribution of health infrastructure resources across different provinces may provide clues to the complexity of differences in access to health services in Türkiye.

III. METHODOLOGY

The methodology employed in this research aims to comprehensively assess the accessibility of healthcare infrastructure resources within Türkiye's provinces from 2012 to 2021. Drawing inspiration from prior research endeavours across diverse national contexts, the methodology integrates quantitative metrics and analytical tools to provide a localized perspective on healthcare accessibility disparities.

Moreover, the perspective developed at the provincial level is extended to the regional level. The geographical distribution of Türkiye into seven distinct regions such as Akdeniz (Mediterranean), Doğu Anadolu (Eastern Anatolia), Ege (Aegean), Güneydoğu Anadolu (Southeastern Anatolia), İç Anadolu (Central Anatolia), Marmara and Karadeniz (Black Sea) provides us with such regionalization is a key tool allowing to look at the interconnection of geography, demographics, and healthcare accessibility in a more detailed way. In this framework, the health indices of provinces were also evaluated on a regional basis.

The following sections outline the key components of the methodology.

3.1. Data Collection and Selection

This research incorporates the garnering of a comprehensive dataset that covers a wide array of health indicators and healthcare infrastructure data. The most important source in this regard is Health Statistics Yearbooks of the Ministry of Health of the Republic of Türkiye (url). The statistics present a broad range of topics, including demographic indicators, mortality, morbidity, risk factors, disease prevention, health infrastructure and access to health services and create a complete picture of the health scene in Türkiye.

In this research, we evaluated health infrastructure accessibility by means of seven criteria: *The number of hospitals, the number of beds, the number of qualified beds, the number of intensive care beds, the number of family physicians, the number of 112 stations, the number of ambulances*. These criteria aimed to provide a comprehensive assessment of accessibility by covering different aspects of health infrastructure. To address the potential issue of scale stemming from variations in provincial populations, the analysis manipulated data on the population per healthcare resource. The temporal scope of the dataset spans from 2012 to 2021, enabling the analysis of trends over a substantial timeframe.

In order to explain the logic of criteria selection for evaluating health infrastructure resources at the provincial level, it would be appropriate to mention the concepts of normative and subjective needs. The concept of normative need is related to the need of a society or individuals for health services determined by experts (Sandman and Hofmann, 2018) and subjective need is an individual's perception of health needs (Staudinger et al., 1999). While normative indicators for assessing a community's access to health infrastructure may include quantitative data such as the ratio of population per doctor, the number of hospitals or ambulances, subjective indicators may include individuals' opinions or experiences in accessing health services, obtained through surveys or satisfaction questionnaires. The combination of these indicators can help to comprehensively assess the actual level of access. However, only indicators for normative needs were available in the data source.

3.2. Descriptive Statistical Analysis

The descriptive statistical analysis is the foundation for the quantitative assessment in this study. Measures like mean, median, standard deviation, and range are used to determine the central tendency, variation, and distribution of healthcare infrastructure resources within the provinces of Türkiye. This analysis gives a picture of the status of the healthcare infrastructure in every province by coming up with the numbers of the accessibility which in turn makes it possible to compare the situation between the provinces.

3.3. Health Index Calculation

Health index, which has a foundation in data collected by descriptive statistics, is computed to assess the healthcare infrastructure accessibility in all aspects. Health index is an instrument that comprises different health indicators in a single numerical value as a result of which cross-province comparison could be done effortlessly. The weighted averages are used for the evaluation of the individual indicators concerning their priority in the healthcare infrastructure. The implementation of this approach enables quickly determine the provinces that have enough infrastructure and those that need to improve in certain sectors.

The transformation of indicators into a single numerical value is achieved through the well-known standardization approach. Let x_i represent a data point in data set, and μ and σ denote the mean and standard deviation of the entire dataset, respectively. The standardized value z_i for x_i is calculated using the formula:

$$z_i = \frac{x_i - \mu}{\sigma}$$

The standardisation approach is used to create a composite index representing various indicators with a single value. Wilhelm et al. (2019) developed a composite indicator with a standardisation approach to measure the quality of maternity and newborn care in low-income countries. A single measure of quality of care was developed by normalising and combining different indicators related to postnatal care, maternal health services, child health services. In addition, Baker et al. (2009) used the standardisation approach in their study on teaching writing to students from disadvantaged backgrounds. These studies are an example of applying a standardisation approach to obtain a single numerical value that can be used for comparison and evaluation in different fields.

3.4. Ethical Considerations

This research adheres to the ethical principles for research with human participants. As the data used in the research are taken from the publicly available official documents, there are no privacy or confidentiality issues. Besides, ethical approval is not necessary because the study deals with secondary data and does not involve the dealing with the people directly.

3.5. Limitations

The analysis is based on the believability and consistency of the data provided by Republic of Türkiye Ministry of Health. Furthermore, descriptive statistical analysis and health indices offer great depth of information but are not able to give the reasons for the observed disparities. Moreover, the weights that are assigned to the indicators in the health index could be a source of some subjectivity. Therefore, this may, eventually, affect the final results. Undoubtedly, these limitations make the study a bit incomplete, but it still offers a general perspective on the accessibility of healthcare infrastructure in the provinces of Türkiye.

IV. FINDINGS

4.1. Descriptive statistical analysis findings

This section presents a summary of the main themes and key points as a result of a thorough examination of health infrastructure resources through various years and regions in Türkiye over the last decade. A careful analysis of the imperative metrics including the aspect of population per hospital, qualified beds, intensive care beds, family physicians, 112 stations and ambulances which unveil the hidden reality of healthcare accessibility. It is this cognitive exercise that is imbued with visible trends,

imperceptible fluctuations, and stark contrasts, which in turn leads to a profound pondering on the progression in the distribution of healthcare resource allocation and its dire implication for a fair distribution.

Table 1 shows a brief description of the results of Descriptive Statistics Analysis of Healthcare Indicators in the period 2012-2021. The assessment was conducted in a structured manner, with a clear and thorough goal which was to assist in summarizing the findings. This analytical framework entailed a bifurcation into two distinct sub-contexts: *"General Observations and Trends"* and *"Specific Insights"*. The data was analysed following the dual-pronged method where the study was able to identify and shed light on the overall patterns, while at the same time, the study was able to afford a more detailed look at particular aspects. Moreover, the next part labelled as *"Additional Metric-Related Concerns"* is dedicated to a weighing of essential discoveries.

Table 1. Descriptive Statistics Analysis of Data Set

	Statistics	Population	P. per Hospital	P. per Bed	P. per Qualified Bed	P. per Intensive Care Bed	P. per Family Physician	P. per 112 Station	P. Per 112 Ambulance
2012	Min	75,797.00	18,158.00	194.00	305.00	1,727.00	2,916.00	8,355.00	3,452.00
	Max	13,854,740.00	124,320.00	801.00	5,393.00	16,709.00	4,375.00	75,709.00	49,482.00
	Average	933,671.41	47,429.30	427.84	1,141.07	4,821.75	3,524.01	34,139.36	18,236.36
	Median	493,691.00	43,546.00	407.00	950.00	3,922.00	3,517.00	30,483.00	15,702.00
	Std. Dev.	1,657,676.85	18,826.18	140.73	672.45	2,701.41	241.33	14,982.21	9,772.84
	CoV	178%	40%	33%	59%	56%	7%	44%	54%
	Kurtosis	46.06	2.48	0.46	18.61	4.67	1.04	0.13	0.63
	Skewness	6.10	1.18	0.78	3.28	1.88	0.48	0.73	0.94
2013	Min	75,620.00	17,086.00	196.00	360.00	1,717.00	2,909.00	7,119.00	3,560.00
	Max	14,160,467.00	128,586.00	806.00	2,026.00	11,024.00	4,267.00	74,139.00	52,253.00
	Average	946,516.84	46,570.63	422.52	980.21	4,215.73	3,499.84	30,177.85	18,039.98
	Median	502,328.00	43,511.00	412.00	860.00	3,705.00	3,504.00	27,344.00	15,650.00
	Std. Dev.	1,693,205.24	18,305.85	125.64	418.22	1,941.82	233.46	12,789.87	9,439.50
	CoV	179%	39%	30%	43%	46%	7%	42%	52%
	Kurtosis	46.28	3.65	0.34	-0.09	1.36	0.70	0.79	1.33
	Skewness	6.12	1.26	0.55	0.88	1.19	0.28	0.80	1.06
2014	Min	80,607.00	17,306.00	156.00	250.00	1,357.00	3,055.00	7,211.00	3,091.00
	Max	14,377,018.00	128,781.00	776.00	2,293.00	10,175.00	4,317.00	67,183.00	49,576.00
	Average	959,208.69	46,458.54	415.64	914.27	3,716.16	3,501.23	28,374.31	15,983.53
	Median	511,790.00	45,337.00	407.00	799.00	3,191.00	3,499.00	26,675.00	13,724.00
	Std. Dev.	1,720,979.52	17,869.31	124.52	440.23	1,582.84	233.05	11,647.66	8,642.63
	CoV	179%	38%	30%	48%	43%	7%	41%	54%
	Kurtosis	46.10	4.48	0.15	1.92	2.03	0.57	0.56	1.87
	Skewness	6.11	1.36	0.48	1.43	1.13	0.44	0.73	1.20
2015	Min	78,550.00	17,216.00	153.00	300.00	1,460.00	2,980.00	8,608.00	3,311.00
	Max	14,657,434.00	130,655.00	794.00	2,401.00	9,772.00	4,425.00	59,342.00	43,238.00
	Average	972,111.77	46,374.38	408.98	798.19	3,436.68	3,484.06	27,022.94	14,167.56
	Median	513,341.00	45,711.00	407.00	737.00	2,878.00	3,480.00	25,247.00	11,678.00
	Std. Dev.	1,755,494.24	17,733.22	116.59	352.83	1,518.02	252.30	10,620.86	7,838.36
	CoV	181%	38%	29%	44%	44%	7%	39%	55%
	Kurtosis	46.09	5.03	0.81	5.38	2.26	1.19	-0.03	1.60
	Skewness	6.11	1.43	0.48	1.93	1.25	0.60	0.60	1.21
2016	Min	82,193.00	13,699.00	197.00	318.00	1,276.00	2,732.00	8,220.00	2,835.00
	Max	14,804,116.00	97,032.00	767.00	2,041.00	11,067.00	4,185.00	58,056.00	35,587.00
	Average	985,368.78	47,362.83	404.85	752.26	3,273.10	3,179.60	26,566.25	12,733.98
	Median	522,175.00	46,007.00	402.00	714.00	2,910.00	3,164.00	23,916.00	10,390.00
	Std. Dev.	1,775,160.77	17,009.17	115.83	291.24	1,558.05	218.65	10,624.84	6,901.61
	CoV	180%	36%	29%	39%	48%	7%	40%	54%
	Kurtosis	45.82	0.18	0.66	5.59	6.75	4.15	0.07	0.62
	Skewness	6.08	0.60	0.68	1.84	1.99	1.04	0.72	0.98
2017	Min	80,417.00	13,750.00	207.00	312.00	1,119.00	2,595.00	6,875.00	2,673.00
	Max	15,029,231.00	99,288.00	798.00	2,034.00	7,449.00	3,435.00	50,604.00	35,280.00
	Average	997,660.80	47,503.91	396.40	670.70	3,066.07	3,099.54	24,743.99	12,650.56
	Median	528,422.00	46,906.00	388.00	622.00	2,629.00	3,099.00	22,467.00	10,319.00
	Std. Dev.	1,802,937.23	16,615.49	117.19	278.22	1,420.73	188.53	9,820.90	7,093.51
	CoV	181%	35%	30%	41%	46%	6%	40%	56%

Statistics	Population	P. per Hospital	P. per Bed	P. per Qualified Bed	P. per Intensive Care Bed	P. per Family Physician	P. per 112 Station	P. Per 112 Ambulance
Kurtosis	45.78	0.08	1.23	10.09	1.35	-0.10	0.13	0.85
Skewness	6.08	0.48	0.88	2.64	1.29	-0.32	0.71	1.05

Table 2. Descriptive Statistics Analysis of Data Set - continued

	Statistics	Population	P. per Hospital	P. per Bed	P. per Qualified Bed	P. per Intensive Care Bed	P. per Family Physician	P. per 112 Station	P. Per 112 Ambulance
	Min	82,274.00	14,700.00	200.00	313.00	1,034.00	2,654.00	7,350.00	2,640.00
	Max	15,067,724.00	101,791.00	831.00	2,069.00	7,709.00	3,668.00	50,226.00	32,404.00
2018	Average	1,012,393.60	47,921.44	395.04	618.75	2,963.46	3,110.21	23,854.68	12,966.95
2018	Median	536,483.00	47,729.00	385.00	603.00	2,530.00	3,109.00	21,836.00	10,847.00
2018	Std. Dev.	1,810,323.78	16,603.70	119.09	241.26	1,384.55	179.80	9,063.31	7,004.79
2018	CoV	179%	35%	30%	39%	47%	6%	38%	54%
2018	Kurtosis	45.33	0.32	1.68	15.82	1.47	0.70	0.21	0.12
2018	Skewness	6.05	0.56	0.98	3.06	1.31	0.11	0.70	0.87
	Min	84,660.00	14,110.00	198.00	312.00	1,030.00	2,680.00	6,513.00	2,116.00
	Max	15,519,267.00	109,138.00	840.00	1,977.00	7,789.00	3,431.00	50,552.00	34,335.00
2019	Average	1,026,604.90	47,879.96	390.59	602.58	2,831.27	3,092.85	22,666.78	11,813.60
2019	Median	536,199.00	46,314.00	379.00	556.00	2,496.00	3,095.00	20,819.00	9,534.00
2019	Std. Dev.	1,862,299.61	17,189.91	117.28	235.48	1,291.72	168.39	9,185.09	6,954.09
2019	CoV	181%	36%	30%	39%	46%	5%	41%	59%
2019	Kurtosis	45.77	0.75	1.91	13.87	2.06	-0.23	0.34	0.71
2019	Skewness	6.08	0.65	1.02	2.87	1.39	-0.25	0.75	1.06
	Min	81,910.00	13,908.00	187.00	313.00	960.00	2,643.00	5,961.00	2,186.00
	Max	15,462,452.00	111,330.00	703.00	1,687.00	5,221.00	3,495.00	45,212.00	30,025.00
2020	Average	1,032,276.07	48,034.10	368.38	573.64	2,253.17	3,082.77	21,631.95	11,231.16
2020	Median	537,762.00	45,259.00	356.00	539.00	1,914.00	3,079.00	19,803.00	9,859.00
2020	Std. Dev.	1,860,980.81	17,445.24	106.91	215.19	922.70	182.35	8,791.84	5,901.22
2020	CoV	180%	36%	29%	38%	41%	6%	41%	53%
2020	Kurtosis	45.09	0.83	1.09	9.03	1.31	-0.28	0.05	0.76
2020	Skewness	6.02	0.67	0.93	2.34	1.34	-0.15	0.67	0.94
	Min	83,645.00	13,941.00	186.00	308.00	953.00	2,637.00	6,435.00	2,261.00
	Max	15,840,900.00	107,151.00	751.00	1,310.00	4,881.00	3,549.00	43,164.00	29,066.00
2021	Average	1,045,435.47	48,011.42	364.86	545.93	2,197.40	3,069.91	21,001.40	11,168.60
2021	Median	546,589.00	45,466.00	348.00	519.00	1,928.00	3,071.00	19,378.00	9,821.00
2021	Std. Dev.	1,902,489.06	17,083.90	106.64	177.04	843.99	181.19	8,273.51	5,877.29
2021	CoV	182%	36%	29%	32%	38%	6%	39%	53%
2021	Kurtosis	45.63	0.56	1.96	3.78	0.92	-0.25	0.14	0.29
2021	Skewness	6.07	0.61	1.11	1.51	1.20	-0.05	0.69	0.85

CoV : Coefficient of variation
P. : Population

4.1.1. General observation and trend

From the countrywide perspective, the findings of the data analysis in the area of healthcare infrastructure resources in various provinces of Türkiye showcase some striking trends and gaps. The key variables like population, population per hospital, population per bed, population per qualified bed, population per intensive care bed, population per family physician, population per 112 station, and population per an ambulance are among the factors that reveal the changing trends in accessibility to healthcare.

The trend that has remained constant is population growth where the average population has been on a rising trend since 2012, starting with 933,671 and increasing to 1,045,435 in 2021. This increase in demand for healthcare services by the population places an extra strain on the current healthcare system resources. The variation of the coefficients for the majority of the variables, including *'Population per*

Hospital', *'Population per Qualified Bed'*, and *'Population per Intensive Care Bed'*, is observed to be comparatively low, which suggests a relatively steady allocation of resources across provinces.

Nonetheless, the nature of these variables is so unique because of their specific regularities. The *'Population Per Hospital'* shows a fluctuating tendency of its peak in 2014 with 128,781 and then a gradual decrease to around 111,330 in 2020. This can be a reflection of the strategic processes related to the distribution of hospitals which are focused on optimizing the hospital distribution, which in turn could result in improving the health care access. The *'Population per Family Physician'* variable indicates a relatively stable trend which implies that the provinces have been observing a constant ratio of the physician to the patient throughout the period. Evidently, the *'Population per Ambulance'* variable appears to be relatively static with some peaks and troughs which may be due to the ambulance distribution being even or a varying demand in different regions.

While these patterns are clear, the large disparities are present as well. For example, the maximum and minimum values for *'Population per Hospital'* and *'Population per Bed'* display tremendous disparities among these years, which implies that there exists a substantial difference in hospital and bed availability among provinces. These disparities could, perhaps, be the sign of unequal development and investment in healthcare infrastructure.

The data indicates a shifting nature of healthcare infrastructure in Türkiye's provinces which are characterized by an increasing population and resources. While some variables exhibit some patterns of consistency, others reflect attempts to even out the distribution of resources. Evidently, the changes in the main factors stress most of the focused approaches to address the inequalities in healthcare access and to provide the equal distribution of the resources in the different regions. These insights become the basis for the development of evidence-based policies that are meant to improve the healthcare accessibility and the resource allocation across the country.

4.1.2. Specific insights

The following discussion elucidate these findings through a comparative lens, shedding light on the evolving nature of disparities over the past decade.

Hospital and Bed: The annually observed trend is the fact of the population per hospital and bed that goes up and down. The fact that the minimum and maximum values vary widely is a clear proof of the diverse healthcare system in Türkiye. Some provinces have nearly constant numbers, while others experience great fluctuations, which show the changing needs of the demand and the resource allocation. For example, the coefficient of variation for population per hospital and bed is between 35-40%, meaning that there is a lot of inequality in these aspects of healthcare access.

Qualified Bed and Intensive Care Bed: The analysis of the data on qualified bed and intensive care bed shows that the differences in these important resources have been fluctuating to a certain extent over the years. While these metrics have a coefficient of variation of 30%-59%, they indicate a considerable degree of inequality. Especially, the kurtosis and skewness values which point out the unusualness of the distribution of data concentration and tail behaviour, indicate the presence of both high and low values in the distribution.

Family Physician and 112 Station: The metrics for family physician and 112 station signifies the primary healthcare access and emergency services availability respectively. The comparative analysis demonstrates a somewhat constant trend in the population per family physician, with a coefficient of variation at around 6-7%. This is different from the variation of population per 112 station. The disparity in the services of emergency medical ranged from 38% to 44% which points out the potential inaccuracies in emergency medical services.

Ambulance Access (Emergency Care): A significant finding emerges from the analysis of ambulance availability. While the population per ambulance shows variations, the data indicates a

relatively stable trend over the years, with a coefficient of variation ranging from 52% to 59%. This suggests a consistent effort to maintain a certain level of emergency medical response capability across provinces.

Temporal Dynamics and Policy Implications: Healthcare infrastructure metrics that are observed to be varying suggest the dynamism of healthcare resources which makes the access to healthcare services always change. The way in which the different provinces have been changing since times immemorial does have its own particularities. While some provinces are demonstrating steady, but slow, improvement, others are still struggling to overcome difficulties, or even losing ground. From the data collected, one can conclude that such policies should be created for a specific district with the concept of equitable health care system distribution throughout the whole area.

The comparison of the healthcare infrastructure indicators of the provinces in Türkiye between the years 2012-2021 exhibits the intricate interconnection of disparities and trends in the process of evolution. The revealed figures show that there is a need to work on these inequalities by means of effective policy tools, resource allocation and targeting approaches. The changing healthcare landscape in Türkiye being developed, therefore, needs a comprehensive understanding of the current scenario which will facilitate equal access to healthcare and optimal health outcomes for all the people regardless of their location.

4.1.3. Additional metric-related concerns

Resource Allocation and Disparities: It is worth noting that the *"Population per Hospital"* metric shows relative stability with slight fluctuations which were around 47,503.91 to 48,011.42 within the timeframe of the studied period. This would mean a balanced approach towards the preservation of the hospital accessibility in terms of the population growth. While the *"Population per Bed"* indicator is exhibited from 396.40 to 364.86, this metric suggests a better bed occupancy rate which could be evidence of a well thought through planning of hospital capacity. However, contrasting figure *"Population per Intensive Care Bed"* demonstrates a significant decline of 3,066.07 to 2,197.40, probably being a signal of the raised concentration of intensive care capacity development.

Skewness and Kurtosis Insights: From the perspective of skewness, and kurtosis values we take another view. On top of this, skewness values for all the metrics are mostly converging to 1, demonstrating the right-skewed distribution, which involves the majority of lower scores and a longer tail with higher scores. The kurtosis values can vary from one metric to the next, thus demonstrating that the data distribution has different patterns. Example: The *"Population per Bed"* metric shows a low kurtosis (0.76), suggesting a less peaked distribution, and the *"Population per Intensive Care Bed"* metric with a higher kurtosis (2.06) shows a more concentrated distribution.

Implications and Policy Considerations: The patterns that are identified are likely to have an effect which will impact on the healthcare policy and planning process. The falling *"Population per Bed"* and *"Population per Intensive Care Bed"* rates illustrate the goal to enhance the availability of health facilities most importantly the intensive care units. The population grows on the continual basis; thus, these measures should be updated on a regular basis, and resources must be reallocated. Besides, the right-skewed values of the distribution, which are concentrated in the areas with a large number of regions having a higher number of values, displays the regions that may be short of resources and should be targeted for further investigation. Achieving this equity would need the designing of policies that are effective and equitable in the way they allocate the resources in accordance with the changing population composition as well as the changing healthcare needs of the citizens.

As provided in Table 2 the Coefficient of Variation (CoV) values are variability of metrics for the years 2012 to 2021. The CoV, expressed as a percentage, elucidates the extent of dispersion within each metric's distribution over the analysed time span. Notably, CoV values enable an assessment of the degree of inequality or diversification in the metrics. And moreover, collectively unravel trends in the distribution of healthcare resources and services, shedding light on the evolving dynamics of population-

centered metrics. It is an important indicator which can be used in policy formulation, resource allocation, and strategic planning towards achieving a better, more equitable and efficient healthcare access for the period in question.

Table 3. Temporal Variability of Metrics

Year	Statistic	Population (%)	P. per Hospital (%)	P. per Bed (%)	P. per Qualified Bed (%)	P. per Intensive Care Bed (%)	P. per Family Physician (%)	P. per 112 Station (%)	P. per Ambulance (%)
2012	CoV	177.54	39.69	32.89	58.93	56.03	6.85	43.89	53.59
2013	CoV	178.89	39.31	29.74	42.67	46.06	6.67	42.38	52.33
2014	CoV	179.42	38.46	29.96	48.15	42.59	6.66	41.05	54.07
2015	CoV	180.59	38.24	28.51	44.20	44.17	7.24	39.30	55.33
2016	CoV	180.15	35.91	28.61	38.71	47.60	6.88	39.99	54.20
2017	CoV	180.72	34.98	29.56	41.48	46.34	6.08	39.69	56.07
2018	CoV	178.82	34.65	30.15	38.99	46.72	5.78	37.99	54.02
2019	CoV	181.40	35.90	30.02	39.08	45.62	5.44	40.52	58.87
2020	CoV	180.28	36.32	29.02	37.51	40.95	5.92	40.64	52.54
2021	CoV	181.98	35.58	29.23	32.43	38.41	5.90	39.40	52.62

CoV: Coefficient of variation
P. : Population

CoV values can be evaluated under various captions as follows.

Yearly Trends in Coefficient of Variation: The pattern is noticeable if you consider the CoV values of the years. The CoV values for most measurements are within a limited range, indicating that the relative variability is rather constant. From 2012 to 2021 the CoV values have been in the range of about 34.65% to 36.32%, shows some level of stability in the relative variability of these metrics. This pattern points to an uninterrupted process of allocating and managing the resources and preventing the excessive fluctuation, which may be due to a combination of adjustments of the policies and advanced planning.

Resource Distribution and Stability: Despite a general consistency in the CoV values, some indicators tend to have a slightly wider range of variability. It is worth noting that the metric, *"Population per Qualified Bed"*, poses variations in its CoV, ranging from 32.43% in 2021 to 58.93% in 2012. This suggests that the qualified beds allocation has been varying over the examined years, with a relatively more heightened variability occurring in the earlier years. Such variations may, to some extent, be associated with the fluctuating demand for specialized medical care or the strategic changes in healthcare infrastructure planning.

Resource Allocation and Preparedness: An observation of interest relates to indicators related to critical care resources, particularly, the *"Population per Intensive Care Bed"* ratio, which is illustratively high in CoV metrics. The explanation for this phenomenon could be the fact that there are the underlying difficulties of the work environment that are characterized by the extreme nature of emergencies. The complexity of the factors comprising the emergence of unexpected events, public health emergencies, and changing medical priorities is what dictates the fluctuation of these trends. Furthermore, the trend line shown for the *"Population per Family Physician"* metric reveals that 2020 and 2021 stand out, requiring a careful analysis that looks into the determinants of this remarkable change.

Implications and Considerations: The stability in observed CoV values implies that there is a degree of consistency in resource allocation practices and this is very important for maintaining the balance in the healthcare system. The slight fluctuations in particular measure highlight the need for flexible resource management strategies that can quickly react to changing needs and obstacles.

4.2. Provincial health resource access inequality index findings

The standardized average of the access to health resources in each province at consecutive intervals is shown in Table 3, from 2012 to 2021. The values mean the relative level of resource availability or unavailability in each province in terms of its population. The higher value means that there are more health resources, and the lower value means that there are limited health resources. The data allow the comparison of the distribution of health resources at the provincial level during the specified period, this provides information about the differences and changes in resource allocation at different regions of Türkiye.

Table 4. Health Index of Provinces

Provinces	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Adana	-0.37	-0.41	-0.51	-0.62	-0.76	-0.52	-0.46	-0.41	-0.36	-0.45
Adıyaman	-0.45	-0.43	-0.22	-0.10	-0.09	0.06	-0.01	-0.04	-0.10	-0.14
Afyonkarahisar	0.59	0.54	0.54	0.45	0.43	0.45	0.45	0.37	0.38	0.40
Ağrı	-1.31	-1.11	-1.12	-1.00	-1.51	-1.33	-0.99	-0.77	-0.99	-0.90
Aksaray	-0.09	-0.43	-0.60	-0.82	-0.61	-0.80	-0.09	-0.08	-0.22	0.13
Amasya	0.30	0.28	0.21	0.10	0.10	-0.08	0.06	0.03	0.01	0.06
Ankara	-0.21	-0.15	-0.28	-0.43	-0.38	-0.44	-0.48	-0.54	-0.52	-0.57
Antalya	-0.42	-0.35	-0.58	-0.63	-0.51	-0.37	-0.40	-0.54	-0.75	-0.78
Ardahan	0.53	0.65	0.68	0.24	0.37	0.24	0.55	0.71	0.60	0.60
Artvin	0.21	0.27	0.05	0.16	0.49	0.53	0.34	0.34	0.38	0.35
Aydın	-0.10	-0.08	-0.03	0.01	-0.07	-0.08	-0.02	-0.08	-0.27	-0.22
Balıkesir	-0.02	-0.12	-0.23	-0.06	-0.09	0.19	0.11	0.07	-0.07	-0.04
Bartın	-0.25	-0.05	0.12	0.13	0.03	-0.05	-0.23	-0.06	-0.26	-0.46
Batman	-0.21	-0.26	-0.38	-0.16	-0.10	-0.35	-0.22	-0.28	0.02	-0.07
Bayburt	0.33	0.20	0.10	0.12	-0.06	0.43	0.37	0.21	0.37	0.71
Bilecik	-0.23	-0.27	-0.26	-0.37	-0.69	-0.85	-0.95	-0.89	0.56	0.37
Bingöl	0.07	0.28	0.16	0.02	-0.02	0.31	0.17	0.18	0.03	0.18
Bitlis	-0.11	-0.07	-0.33	-0.31	0.08	0.15	0.11	0.25	0.12	0.14
Bolu	1.14	1.16	1.27	1.13	1.10	0.97	0.87	0.89	0.95	0.92
Burdur	0.74	0.68	0.67	0.55	0.57	0.53	0.56	0.57	0.55	0.54
Bursa	-0.64	-0.85	-0.81	-0.88	-0.98	-0.95	-0.85	-0.79	-0.83	-0.87
Çanakkale	0.02	0.10	-0.09	-0.07	-0.03	0.01	0.21	0.24	0.20	0.21
Çankırı	0.61	0.27	0.44	0.57	0.31	0.35	-0.27	0.07	0.01	0.10
Çorum	0.45	0.45	0.66	0.69	0.61	0.69	0.70	0.71	0.66	0.74
Denizli	0.19	0.06	0.19	0.09	0.19	0.13	0.09	0.05	-0.08	-0.26
Diyarbakır	-0.24	-0.07	-0.30	-0.37	-0.46	-0.56	-0.48	-0.55	-0.70	-0.55
Düzce	-0.45	-0.66	-0.37	-0.49	-0.45	-0.43	-0.40	-0.36	-0.42	-0.33
Edirne	0.64	0.69	0.64	0.67	0.71	0.59	0.61	0.53	0.64	0.57
Elazığ	0.78	0.82	0.78	0.63	0.55	0.61	0.72	0.76	0.81	0.82
Erzincan	0.98	0.90	0.76	0.67	0.42	0.16	0.16	0.14	0.58	0.49
Erzurum	0.87	0.94	0.90	0.87	0.90	0.90	0.90	0.87	0.77	0.79
Eskişehir	0.52	0.48	0.22	0.17	0.24	-0.09	0.18	0.14	0.21	0.20
Gaziantep	-0.90	-0.75	-0.80	-0.66	-0.37	-0.33	-0.41	-0.45	-0.36	-0.33
Giresun	0.63	0.63	0.69	0.78	0.74	0.79	0.66	0.71	0.87	0.87
Gümüşhane	0.75	0.51	0.38	0.19	-0.34	-0.41	-0.16	-0.38	-0.06	0.05
Hakkari	-0.82	-0.93	-0.84	-0.88	-1.29	-1.02	-1.18	-0.99	-1.09	-0.91
Hatay	-0.81	-0.90	-0.87	-0.71	-0.45	-0.45	-0.26	-0.39	-0.37	-0.47
Iğdır	-0.50	-0.68	-0.84	-0.37	-0.18	-0.46	-0.57	-0.72	-0.78	-0.87
Isparta	1.05	1.05	1.06	0.97	1.07	1.07	1.07	1.05	1.09	1.08
İstanbul	-1.00	-1.23	-1.31	-1.30	-1.10	-1.14	-0.82	-1.00	-0.85	-0.93
İzmir	-0.27	-0.45	-0.67	-0.80	-0.90	-1.05	-0.94	-0.91	-0.99	-1.06
Kahramanmaraş	-0.38	-0.25	-0.07	-0.03	-0.07	-0.06	-0.03	-0.14	-0.20	-0.13
Karabük	0.46	0.40	0.60	0.68	0.51	0.45	0.53	0.57	0.69	0.56
Karaman	0.55	0.42	0.65	0.44	0.50	0.43	0.60	0.66	0.61	0.39
Kars	0.24	0.32	0.34	0.34	0.45	0.50	0.43	0.45	0.44	0.48
Kastamonu	0.64	0.38	0.31	0.11	0.08	0.44	0.39	0.39	0.49	0.34
Kayseri	0.17	0.09	0.03	-0.03	-0.12	-0.21	0.07	0.08	0.03	0.02

Provinces	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Kilis	-0.74	-1.10	-0.89	-0.39	0.49	0.35	0.19	0.10	0.10	0.11
Kırıkkale	0.37	0.59	0.83	0.99	0.82	0.83	0.74	0.72	0.70	0.77
Kırklareli	-0.06	-0.19	0.03	0.20	0.23	0.24	0.20	0.25	0.38	0.32
Kırşehir	0.54	0.72	0.55	0.45	0.20	0.21	0.14	0.06	0.03	0.28
Kocaeli	-0.65	-0.56	-0.57	-0.64	-0.76	-1.05	-0.99	-1.05	-1.12	-1.18
Konya	0.07	0.03	-0.10	-0.07	-0.07	-0.13	-0.09	-0.09	0.00	-0.03

Table 5. Health Index of Provinces – continued

Provinces	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Kütahya	0.45	0.43	0.39	0.33	0.39	0.13	0.34	0.33	0.33	0.33
Malatya	0.34	0.53	0.51	0.56	0.51	0.52	0.58	0.59	0.50	0.61
Manisa	0.22	0.22	0.19	0.08	-0.02	-0.05	-0.02	0.05	-0.05	-0.02
Mardin	-1.36	-1.65	-1.35	-1.26	-1.21	-0.79	-0.94	-0.98	-1.19	-1.22
Mersin	-0.68	-0.63	-0.53	-0.55	-0.49	-0.30	-0.22	-0.25	-0.33	-0.44
Muğla	0.23	0.22	0.00	-0.09	-0.19	-0.20	-0.33	-0.32	-0.32	-0.46
Muş	-1.10	-0.89	-0.89	-0.55	-0.73	-0.49	-0.55	-0.55	-0.87	-0.83
Nevşehir	0.30	0.18	0.26	0.31	0.28	0.32	0.44	0.34	0.31	0.42
Niğde	0.15	0.23	0.04	0.28	0.33	0.33	0.26	0.26	0.22	0.21
Ordu	-0.09	-0.10	-0.06	0.02	-0.01	0.04	-0.08	0.07	0.03	0.19
Osmaniye	-0.32	-0.36	-0.11	0.02	0.26	0.16	0.11	0.14	-0.01	-0.11
Rize	0.59	0.65	0.67	0.62	0.64	0.50	0.35	0.32	0.24	0.18
Sakarya	-0.31	-0.48	-0.50	-0.63	-0.69	-0.75	-0.70	-0.72	-0.64	-0.74
Samsun	0.19	0.25	0.19	0.12	-0.06	-0.10	-0.11	-0.08	-0.12	-0.09
Şanlıurfa	-1.40	-1.40	-1.41	-1.35	-1.13	-1.21	-1.37	-1.49	-1.53	-1.49
Siirt	-0.27	-0.05	0.35	0.29	0.45	0.36	0.30	0.31	0.00	0.01
Sinop	0.26	0.10	0.18	0.09	0.25	0.08	0.17	0.35	0.51	0.68
Şırnak	-0.79	-0.80	-0.71	-0.79	-1.22	-1.05	-1.48	-1.58	-1.45	-1.70
Sivas	0.68	0.68	0.69	0.71	0.80	0.76	0.64	0.71	0.71	0.78
Tekirdağ	-0.46	-0.39	-0.46	-0.38	-0.08	-0.30	-0.36	-0.30	-0.30	-0.31
Tokat	0.23	0.37	0.43	0.49	0.50	0.55	0.52	0.45	0.54	0.48
Trabzon	0.69	0.78	0.72	0.70	0.64	0.55	0.54	0.52	0.52	0.57
Tunceli	-0.57	0.83	0.67	0.62	0.66	0.62	0.35	0.43	0.42	0.48
Uşak	0.31	0.58	0.49	0.61	0.62	0.49	0.50	0.48	0.42	0.36
Van	-0.10	-0.21	-0.29	-0.49	-0.31	-0.31	-0.41	-0.40	-0.49	-0.37
Yalova	-0.18	-0.29	-0.40	-0.25	-0.13	-0.06	-0.26	-0.18	-0.18	-0.31
Yozgat	-0.16	-0.17	0.06	0.09	0.13	0.61	0.69	0.66	0.63	0.57
Zonguldak	-0.04	-0.19	0.09	0.18	0.07	0.19	0.18	0.20	0.20	0.17

Values represent the standardized average of the province's access to health resources in the relevant year. A high value indicates that the province is relatively resource abundant relative to its population, while a low value indicates that the province is relatively resource scarce relative to its population.

The health index data is an indicator of the differences in access to healthcare resources across the provinces in Türkiye. The comprehensive analysis provides some interesting conclusions about the allocation and availability of healthcare infrastructure. The health index that is a mean of standardized indicator values for each year is an essential tool for the evaluation of the degree of resource distribution inequalities between the provinces. In order to emphasize the importance of this indicator as a tool for discovering space differences in the provision of healthcare services, the meaning of the index values can be underlined.

From 2012 to 2021, the health index values show differences that can be seen which mean the distribution and availability of resources are not equal. Provinces with increased index scores, as in the case of Isparta and Bolu, always manage to have an adequate share of healthcare facilities, beds, and qualified personnel. The provinces, which demonstrate a very pleasant picture of healthcare accessibility, are characterized by their constant high scores since the beginning of the analysis period. For instance, the provinces with lower health indexes, including Şanlıurfa, Mardin, Ağrı, and Şırnak, have been dealing with a more challenging environment, which is characterized by inadequate healthcare services. Besides, some provinces, including Erzurum and Kırıkkale, being mild in the health

index in the beginning, show fluctuations in the scores through the years. This variance can be accredited to dynamic changes of healthcare resource distribution, which originates from the alterations in policy measures, population dynamics, or other contextual issues that affect the health system infrastructure deployment. Further, the provinces of Diyarbakır, Muş, and Hakkari are observed showing relatively high fluctuations on their health index values throughout the examined period. These fluctuations are a reflection of the complicated interplay between resource allocation and regional healthcare demand. It is probable that external factors, such as governmental programs, technological achievements, and medical policy changes, play a defining role in the observed changes.

The health index, in fact, is a powerful tool that carries the ability of describing the intricate picture of the healthcare inequalities that are common in the Turkish provinces. These scores, in addition to supplying a complete bird's eye view of the disproportionate distribution of healthcare resources, also enable to direct efforts on the specific areas that need the most intervention. Index changes dynamically to stress the importance of continuous monitoring and policy adjustment so that all regions will equally receive the healthcare resources.

Significant patterns are observed when province-based health indices are analysed at the geographical region dimension. The Mediterranean region which includes cities of Adana, Antalya, and Isparta, seems to be the only area with a fair healthcare access scenario that has been first to portray the highest health index scores. Instead, the areas such as Eastern Anatolia and Southeastern Anatolia, including provinces like Ağrı, Bitlis, and Şanlıurfa, have been continuously displaying lower health index scores, which means that healthcare is still not easily accessible in these regions. Density of population is also a factor that needs to be considered in the Marmara area in which Istanbul, a highly populated province, and Balıkesir, a less populated province, are located. Interestingly, the region stands out from the rest in terms of the range of health index scores. While Istanbul, a metropolitan city, shows various differences and lower ratings, Bursa and Çanakkale provinces are in a better position as the accessibility of healthcare is more improved.

Within the span of a decade, health index scores reveal fluctuations. Some provinces, such as İzmir in the Aegean region encounter a decrease in their trajectory, and this could be a sign of the problem of providing equitable healthcare access in future. Besides, the Eastern Anatolia region suffers from the consistent low scores which are a sign of the permanent problem of the resource scarcity. discussion

IV. DISCUSSION

This research has produced important findings through descriptive statistical analysis of health infrastructure indicators of provinces in Türkiye. The results illustrate that there are large disparities in health resources allocation across provinces. In other words, the health index scores show a lot of fluctuations, which means that the distribution of health resources is changing and has a dynamic and variable nature. The continuous ebb and flow may be due to changes in the policy frameworks, demographic dynamics or other contextual factors that affect the equitable distribution of health infrastructure. Hence, those multifaceted factors should be considered in health infrastructure strategy and management and the environment of the equitable accessibility should be created.

Studies on regional inequalities in Sudan (Ismail, 2020), regional health inequalities in China (Fang et al., 2010) and the geographical distribution of health resources in traditional Chinese medicine hospitals in China (Zhu et al., 2020) are in line with the findings of this research conducted in Türkiye. These studies highlight the significance of the knowledge and the solution of inequalities in the allocation of health resources for equitable access to the health services. Also, the research on the relationship between inequality and population health in low- and middle-income countries by Deurzen et al. (2014) highlights the role of eliminating inequalities to achieve better health outcomes. Additionally, Jiménez-Rubio et al's (2007) research on health and health care equity in a decentralized context offers some perspective on resource allocation and health care inequalities which are essential for understanding the dynamics of health resource distribution among Canada's provinces.

V. CONCLUSION

In recent years, Türkiye's healthcare system has faced significant challenges, underscoring the need for equitable access to health services. Despite the Health Transformation Program's efforts, issues like population growth, the influx of Syrian migrants, and economic slowdowns have strained these goals. Assessing healthcare infrastructure at the provincial level becomes crucial in this context. This study evaluates health infrastructure indicators across 81 provinces from 2012 to 2021, revealing notable inequalities in access to healthcare services and their implications for policymakers.

The findings indicate that some provinces face critical shortages in healthcare infrastructure. For example, high population-to-intensive care bed ratios in Şanlıurfa, Mardin, Ağrı, and Şırnak point to significant deficiencies in healthcare services. To address these gaps, it is essential to increase intensive care capacity and enhance emergency healthcare capabilities in these regions. Such inadequacies highlight the urgency of prioritizing investments and planning for emergency health services in under-resourced areas.

Conversely, provinces like Isparta and Bolu consistently show high health index scores, indicating effective use and distribution of healthcare infrastructure. Studying the successful practices in these provinces can provide valuable insights for improving health services in other regions. Sharing these best practices is crucial for developing effective health policies.

The fluctuating health index scores in provinces such as Adıyaman and Aksaray reveal instability in the continuity and quality of healthcare services. Ensuring sustainable healthcare in these regions requires long-term and stable planning. Specifically, implementing a regular and predictable strategy for the distribution of healthcare personnel and medical supplies is necessary.

Across Türkiye, the demand for healthcare services has surged with population growth, but the healthcare infrastructure has not kept pace. Significant disparities in critical services, such as intensive care beds and ambulance services, necessitate reallocating resources to address regional disparities. Immediate interventions are required to ensure equitable access to healthcare services.

Policymakers can draw several conclusions from this study. There is a pressing need to boost healthcare infrastructure investments in provinces with low health index scores. For example, expanding the number of intensive care beds and improving emergency medical services in provinces like Şanlıurfa, Mardin, Ağrı, and Şırnak should be prioritized. Additionally, adopting successful strategies from high-performing provinces like Isparta and Bolu could serve as a model for other regions. Developing long-term, stable healthcare plans for provinces with fluctuating health index scores, such as Adıyaman and Aksaray, is crucial to ensure consistent service delivery.

This study highlights the significant inequalities in access to health services across Türkiye's provinces, emphasizing the need for a more equitable distribution of health resources. Addressing these deficiencies is essential for enhancing the overall efficiency and accessibility of Türkiye's healthcare system. The findings offer a foundation for data-driven decision-making in shaping health policies, ensuring that targeted investments and effective strategies are implemented to improve healthcare infrastructure and service delivery across the country.

Ethical approval: Ethical approval is not necessary because the study deals with secondary data and does not involve the dealing with the people directly.

REFERENCES

Akinci, F., Mollahaliloğlu, S., Gürsöz, H., & Öğücü, F. (2012). Assessment of the Turkish health care system reforms: A stakeholder analysis. *Health Policy*, *107*(1), 21–30. https://doi.org/10.1016/J.HEALTHPOL.2012.05.002

Ali Jadoo, S. A., Aljunid, S. M., Sulku, S. N., & Nur, A. M. (2014). Turkish health system reform from the people's perspective: A cross sectional study. *BMC Health Services Research*, *14*(1), 1–9. https://doi.org/10.1186/1472-6963-14-30

Baker, S., Chard, D., Ketterlin-Geller, L., Apichatabutra, C., & Doabler, C. (2009). Teaching writing to at-risk students: the quality of evidence for self-regulated strategy development. *Exceptional Children*, *75*(3), 303-318. https://doi.org/10.1177/001440290907500303

Bener, A., Alayoglu, N., Çatan, F., Torun, P., & Yilmaz, E. (2019). Health services management in Turkey: Failure or success? *International Journal of Preventive Medicine*, *10*(1), 30. https://doi.org/10.4103/2008-7802.253420

Büken, N. Ö. (2009). The health system, health policies and health transformation program in Turkey. *Medicine and Law*, *28*(1), 23–45.

Chen, L., Chen, T., Lan, T., Chen, C., & Pan, J. (2023). The Contributions of Population Distribution, Healthcare Resourcing, and Transportation Infrastructure to Spatial Accessibility of Health Care. *Inquiry (United States)*, *60*. https://doi.org/10.1177/00469580221146041

Currie, W. L., & Seddon, J. J. M. (2014). A cross-national analysis of eHealth in the European Union: Some policy and research directions. *Information & Management*, *51*(6), 783–797. https://doi.org/10.1016/J.IM.2014.04.004

Cutler, D. M., & Summers, L. H. (2020). The COVID-19 Pandemic and the $16 Trillion Virus. *JAMA*, *324*(15), 1495–1496. https://doi.org/10.1001/JAMA.2020.19759

Deurzen, I., Oorschot, W., & Ingen, E. (2014). The link between inequality and population health in low and middle income countries: policy myth or social reality?. *Plos One*, *9*(12). https://doi.org/10.1371/journal.pone.0115109

Dundar, M., & Ozdemir, S. Y. (2012). Overview of the Healthcare System in Turkey. *Advances in Predictive, Preventive and Personalised Medicine*, *1*, 167–187. https://doi.org/10.1007/978-94-007-4602-2_10

Elola, J., Daponte, A., & Navarro, V. (1995). Health indicators and the organization of health care systems in Western Europe. *American Journal of Public Health*, *85*(10), 1397–1401. https://doi.org/10.2105/AJPH.85.10.1397

Fagnani, F., & Dumenil, G. (1976). Health indicators or health system analysis? Extracts from a French survey. *Social Indicators Research*, *3*(1), 37–74. https://doi.org/10.1007/BF00286163

Fang, P., Si-ping, D., Xiao, J., Liu, G., Xiang, F., & Wang, Y. (2010). Regional inequality in health and its determinants: evidence from China. *Health Policy*, *94*(1), 14-25. https://doi.org/10.1016/j.healthpol.2009.08.002

Farajzadegan, Z., Javadi, A., Asgari, G., & Manzoori, L. (2007). Indicators of Utilization as a Means for Assessment of Health Information Management Systems. *Health Information Management*, *4*(1), 23-31.

Fleurbaey, M., & Schokkaert, E. (2009). Unfair inequalities in health and health care. *Journal of Health Economics*, *28*(1), 73–90. https://doi.org/10.1016/J.JHEALECO.2008.07.016

Groenewegen, P. P. (2013). Analyzing European health systems: Europe as a research laboratory. *European Journal of Public Health*, *23*(2), 185–186. https://doi.org/10.1093/EURPUB/CKT032

Hafeez, A., Dangel, W. J., Ostroff, S. M., Kiani, A. G., Glenn, S. D., Abbas, J., Afzal, M. S., Afzal, S., Ahmad, S., Ahmed, A., Ahmed, H., Ali, L., Ali, M., Ali, Z., Arshad, M., Ashraf, T., Bhutta, Z. A., Bibi, S., Butt, Z. A., … Mokdad, A. H. (2023). The state of health in Pakistan and its provinces and territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019. *The Lancet Global Health*, *11*(2), 229–243. https://doi.org/10.1016/S2214-109X(22)00497-1

Javad, S., Sheykholeslami, S., Rahmani, S., & Yousefi, A. A. (2015). Assessment of the access of the cities of Alborz province to healthcare infrastructure using TOPSIS and MORIS models. *Management Issues in Healthcare System*, *1*(1), 38–48. https://doi.org/10.33844/MIHS.2015.60347

Ismail, M. (2020). Regional disparities in the distribution of Sudan's health resources. *Eastern Mediterranean Health Journal*, *26*(9), 1105-1114. https://doi.org/10.26719/emhj.20.056

Jiménez-Rubio, D., Smith, P., & Doorslaer, E. (2007). Equity in health and health care in a decentralised context: evidence from Canada. *Health Economics*, *17*(3), 377-392. https://doi.org/10.1002/hec.1272

Kaltenthaler, E., Maheswaran, R., & Beverley, C. (2004). Population-based health indexes: a systematic review. *Health Policy*, *68*(2), 245–255. https://doi.org/10.1016/J.HEALTHPOL.2003.10.005

Kruk, M. E., & Freedman, L. P. (2008). Assessing health system performance in developing countries: a review of the literature. *Health Policy*, *85*(3), 263–276.

Lee, S. M., & Lee, D. (2020). Lessons Learned from Battling COVID-19: The Korean Experience. *International Journal of Environmental Research and Public Health 2020, Vol. 17, Page 7548*, *17*(20), 7548. https://doi.org/10.3390/IJERPH17207548

Lee, S. Y., Kim, C. W., Seo, N. K., & Lee, S. E. (2017). Analyzing the Historical Development and Transition of the Korean Health Care System. *Osong Public Health and Research Perspectives*, *8*(4), 247. https://doi.org/10.24171/J.PHRP.2017.8.4.03

Levin-Zamir, D., Sorensen, K., Su, T. T., Sentell, T., Rowlands, G., Messer, M., Pleasant, A., Saboga Nunes, L., Lev-Ari, S., & Okan, O. (2021). Health promotion preparedness for health crises – a 'must' or 'nice to have'? Case studies and global lessons learned from the COVID-19 pandemic. *Global Health Promotion*, *28*(2), 27–37. https://doi.org/10.1177/1757975921998639

Li, O. Y., Wang, X., Yang, K., Liu, D., & Shi, H. (2023). The approaching pilot for One Health governance index. *Infectious Diseases of Poverty*, *12*(1), 1–10. https://doi.org/10.1186/S40249-023-01067-2

Liu, T., Li, J., Chen, J., & Yang, S. (2020). Regional Differences and Influencing Factors of Allocation Efficiency of Rural Public Health Resources in China. *Healthcare*, *8*(3), 270. https://doi.org/10.3390/HEALTHCARE8030270

Mangano, A. (2010). An analysis of the regional differences in health care utilization in Italy. *Health & Place*, *16*(2), 301–308. https://doi.org/10.1016/J.HEALTHPLACE.2009.10.013

Marcassoli, A., Leonardi, M., Passavanti, M., De Angelis, V., Bentivegna, E., Martelletti, P., & Raggi, A. (2023). Lessons Learned from the Lessons Learned in Public Health during the First Years of

COVID-19 Pandemic. *International Journal of Environmental Research and Public Health*, *20*(3), 1785. https://doi.org/10.3390/IJERPH20031785/S1

Mollahaliloglu, S., Kavuncubasi, S., Yilmaz, F., Younis, M. Z., Simsek, F., Kostak, M., Yildirim, S., & Nwagwu, E. (2018). Impact of health sector reforms on hospital productivity in Turkey: Malmquist index approach. *International Journal of Organization Theory and Behavior*, *21*(2), 72–84. https://doi.org/10.1108/IJOTB-03-2018-0025

Nguyen, N. H., Subhan, F. B., Williams, K., & Chan, C. B. (2020). Barriers and Mitigating Strategies to Healthcare Access in Indigenous Communities of Canada: A Narrative Review. *Healthcare*, *8*(2), 112. https://doi.org/10.3390/HEALTHCARE8020112

Oguz, A. B. (2020). Turkish Health Policies: Past, Present, and Future. *Social Work in Public Health*, *35*(6), 456–472. https://doi.org/10.1080/19371918.2020.1806167

Orkin, F. G. K. and A. M. (2020). Improving Health and Healthcare Access for People who Experience Imprisonment in Ontario. *Healthcare Quarterly*, *23*(1), 6–9.

Presidency of Migration Management. (2023). *Temporary Protection*. https://en.goc.gov.tr/temporary-protection27

Puspitasari, D. A., & Bulan, S. O. (2021). The effect of accessibility and availability of health infrastructure on maternal healthcare utilization in Indonesia to achieve Sustainable Development Goals. *IOP Conference Series: Earth and Environmental Science*, *716*(1), 012110. https://doi.org/10.1088/1755-1315/716/1/012110

Rothenberg, R., Stauber, C., Weaver, S., Dai, D., Prasad, A., & Kano, M. (2015). Urban health indicators and indices - Current status. *BMC Public Health*, *15*(1), 1–14. https://doi.org/10.1186/S12889-015-1827-X

Sandman, L. and Hofmann, B. (2018). Why we don't need "unmet needs"! on the concepts of unmet need and severity in health-care priority setting. *Health Care Analysis*, *27*(1), 26-44. https://doi.org/10.1007/s10728-018-0361-2

Šídlo, L., & Maláková, K. (2022). Spatial Healthcare Accessibility: A District-Level Analysis of Travel for Outpatient Diabetology in Czechia. *Healthcare*, *10*(2), 395. https://doi.org/10.3390/HEALTHCARE10020395

Staudinger, U., Fleeson, W., & Baltes, P. (1999). Predictors of subjective physical health and global well-being: similarities and differences between the united states and germany. *Journal of Personality and Social Psychology*, *76*(2), 305-319. https://doi.org/10.1037/0022-3514.76.2.305

Sundararaman, T., Muraleedharan, V. R., & Ranjan, A. (2021). Pandemic resilience and health systems preparedness: lessons from COVID-19 for the twenty-first century. *Journal of Social and Economic Development*, *23*(S2), 290–300. https://doi.org/10.1007/S40847-020-00133-X

Taqi, M., Bidhuri, S., Sarkar, S., Suhail Ahmad, W., Wangchok, P., Bidhuri, M., Sarkar, S., Ahmad, S., & Wangchok, W. (2017). Rural Healthcare Infrastructural Disparities in India: a Critical Analysis of Availability and Accessibility. *Journal of Multidisciplinary Research in Healthcare*, *3*(2), 125–149. https://doi.org/10.15415/JMRH.2017.32011

Tatar, M., Mollahaliloğlu, S., Sahin, B., Aydin, S., Maresso, A., & Hernández-Quevedo, C. (2011). Turkey: Health system review 2011. *Health Systems in Transition*, *13*(6).

Tressel, T., & Ding, X. (2021). Global Corporate Stress Tests—Impact of the COVID-19 Pandemic and Policy Responses. *IMF Working Papers*, *2021*(212), 1. https://doi.org/10.5089/9781513590820.001

TURKSTAT. (2023). *Turkish Statistical Institute*. https://www.tuik.gov.tr/

WB, & WHO. (2021). Tracking Universal Health Coverage. *Tracking Universal Health Coverage*. World Health Organization and World Bank. https://doi.org/10.1596/36724

Wilhelm, D., Lohmann, J., Allegri, M., Chinkhumba, J., Muula, A., & Brenner, S. (2019). Quality of maternal obstetric and neonatal care in low-income countries: development of a composite index. *BMC Medical Research Methodology*, 19(1). https://doi.org/10.1186/s12874-019-0790-0

World Health Organization. (2022). WHO Coronavirus Disease (COVID-19) Dashboard With Vaccination Data | WHO Coronavirus (COVID-19) Dashboard With Vaccination Data. *World Health Organization* (1–5). https://covid19.who.int/

Wulandari, R. D., Laksono, A. D., Rohmah, N., & Ashar, H. (2023). Regional differences in primary healthcare utilization in Java Region—Indonesia. *Plos One*, *18*(3). https://doi.org/10.1371/JOURNAL.PONE.0283709

Zhu, D., Shi, X., Nicholas, S., & He, P. (2020). Regional disparities in health care resources in traditional Chinese medicine county hospitals in China. *Plos One*, *15*(1). https://doi.org/10.1371/journal.pone.0227956