



## Research Article

# Turkey and Europe data comparison in terms of the course of the COVID-19 pandemic and health expenses

COVID-19 pandemisinin seyri ve sağlık giderleri açısından Türkiye ve Avrupa veri karşılaştırması

 Feruza Turan Sonmez<sup>a</sup>,  Cemil Isik Sonmez<sup>b</sup>

<sup>a</sup> Department of Emergency Medicine, Faculty of Medicine, Duzce University, Duzce, Turkey

<sup>b</sup> Department of Family Medicine, Faculty of Medicine, Duzce University, Duzce, Turkey

## Abstract

**Introduction:** The COVID-19 pandemic has affected the entire world and has been a challenge to the health prospects of the nations infected. The elderly population of the nations and parameters like the countries' health system and the allocation of budget to health are critical factors for explaining the epidemic's development with different mortality rates in various countries. The purpose of the study was to assess the characteristics of the Turkish population, COVID cases, the progression of diseases, and health expenditures compared to those in Europe.

**Methods:** For this study, we used the following databases: the Worldometer digital database, the database of the Organization for Economic Cooperation and Development, and the Turkish National Databases on Economic and Finance references, such as the Turkish National Strategy and Budget Presidency and the database of the Turkish Statistical Institute. The data was for the date 15.12.2021 and the general annual for 2020.

**Results:** By the investigation date as of 15/12/2021, the total number of COVID-19 cases was 9209740 in Turkey and 81556853 in the European Union countries. The incidence of the disease was 107.500 in Turkey and 135.525 in Europe. While the total change/ increase in last-week-new cases was -5% and 8% in Turkey and Europe, respectively, the real change/ increase in last-week-deaths was -1% to -8% in Turkey and Europe. The number of COVID screening tests per one million population was higher in Europe (1.343.256 to 8.790.27 in Turkey and Europe, respectively). The GDP and health expenditure per capita were distinctly higher in Europe.

**Conclusion:** The fact that there is a higher percentage of elderly residents in European countries than in Turkey, that the number of new cases detected every week is higher, and that the death rate and the gradual decline in cases are linked to the large share of health expenditures distributed by nations for the fight against the disease.

**Keywords:** Health Expenditures, COVID-19, Turkey, Pandemics, Europe, Incidence

## Öz


**Giriş:** COVID-19 pandemisi tüm dünyayı etkisi altına almış olup, ülkelerin sağlık imkanlarını zorlamıştır. Salgının çeşitli ülkelerde farklı mortalite oranlarıyla seyretmesinin altında yatan en önemli etkenler ülkelerin yaşlı nüfusunun yanı sıra şüphesiz ülkelerin sağlık sistemleri ve sağlığa ayrılan bütçesi olarak sayılabilir. Bu çalışma ile Türkiye nüfus bilgilerini, COVID-19 vakalarını, hastalıkların seyrini ve sağlık harcamalarını değerlendirmeyi ve Avrupa verileriyle karşılaştırmayı hedefledik.

**Yöntem:** Bu çalışma için kullanılan veritabanları: Worldometer dijital veritabanı, Ekonomik İş birliği ve Kalkınma Teşkilatı dijital veritabanı, Türkiye Ulusal Strateji ve Bütçe Başkanlığı gibi Türkiye Ulusal Ekonomi ve Finans Veri Tabanları ve Türkiye İstatistik Kurumu veri tabanı, Veriler 15.12.2021 tarihinde derlenmiş ve 2020 yılı için genel bilgiler dahil edilmiştir.

**Bulgular:** 15/12/2021 inceleme tarihi itibarıyla Türkiye'de toplam COVID-19 vaka sayısı 920.9740 ve Avrupa Birliği ülkelerinde 81.556.853'tür. Hastalığın insidansı Türkiye'de 107.500, Avrupa'da 135.525 idi. Geçen hafta-yeni vakalardaki toplam değişim/artışı oranı Türkiye ve Avrupa'da sırasıyla-%5 ve %8 iken, geçen hafta-ölümlerdeki toplam değişim/artış oranı Türkiye ve Avrupa'da sırasıyla-%1 ile-%8 oldu. Bir milyon nüfus başına COVID-19 tarama testi sayısı Avrupa'da belirgin şekilde daha yüksekti (sırasıyla Türkiye ve Avrupa'da 1.343.256 ile 8.790.27). Kişi başına GSYİH ve sağlık harcaması Avrupa'da belirgin şekilde daha yüksekti.

**Sonuç:** Avrupa ülkelerinde Türkiye'yle kıyasla yaşlı nüfusunun daha yüksek olması ve haftalık saptanan yeni vaka sayısının daha yüksek olmasına rağmen ölüm oranı ve sayısının giderek düşmesi ülkelerin salgınla mücadelede ayırdıkları sağlık harcamaları payının yüksek olması ile ilişkilidir.

**Anahtar kelimeler:** Sağlık Harcamaları, COVID-19, Türkiye, Pandemi, Avrupa, İnsidans

Received	Accepted	Published Online	Corresponding Author	E-mail
November 30, 2020	May 11, 2022	May 31, 2022	Feruza Turan Sonmez, M.D.	<a href="mailto:feruzaturan@yahoo.com">feruzaturan@yahoo.com</a>
Correspondence	Dr. Feruza Turan Sönmez. Düzce Üniversitesi Tıp Fakültesi Acil Tıp ABD. 81620 Yörük/Düzce/Merkez-Turkey			
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## Key Points

1. A country's GDP per capita and health expenditure are inversely proportional to the weekly death rate caused by the COVID pandemic.
2. Rates of screening tests conducted in the community are closely related to incidence rates in the population.
3. The weekly mortality rates seem to have declined as the number of screening tests increased.

## Introduction

Pandemic is a worldwide epidemic that can cause significant morbidity and mortality. There have been great epidemics in different periods in the world. Most were associated with wars, immigration, and disasters. Closer to our days, the 21st century had new and hazardous difficulties managing infectious diseases. Infections named Severe Acute Breathing Syndrome (SARS), Middle East Respiratory Syndrome (MERS), Ebola, or Zika can be added to newer health emergencies affecting large populations. In addition, pandemics have difficulties in medical management and overseeing permanent financial results that arise as consequences [1]. The latest COVID-19 pandemic has caused more damage than other infectious diseases around the worldwide diseases and their associated burdens. In addition to its distressing effects on human life, the new Coronavirus disease has the potential to significantly slow down entire economies of the world as a whole. Therefore, in combating the epidemic, many measures aim to minimize the costs associated with the disease [2].

There are several reasons to investigate any suspected epidemics. Among the grounds is a governmental responsibility to take protective and control measures: earlier evaluation and research on epidemics aid in evaluating public relations and legal obligations [1]. The world's first severe pandemic experience was based on the 1918-Global flu, which killed 40 million people worldwide from 1918-to 1919. The Global flu in 1918 infected a third of the world's population. As a simulation, it is predicted that if a comparable situation arises today, it will spread rapidly across the globe and could result in the deaths of more than 80 million people. A report from Cambridge University estimates that if the flu epidemic of 1918-1919 occurs again, it could result in an economic cost of more than \$ 4 trillion [1]. We learned from the earlier pandemic experience that monitoring cases, health education, isolation, and hygiene would prevent the spread of flu strains. But, again, the persistence of the flu in waves for almost two years indicates the high cost of loosening these measures prematurely today [1].

Another epidemic experience of the world is the Ebola epidemic that occurred in Africa from 2013-to 2016. Approximately 11,300 people died. Looking at the economic and social impact of the Ebola epidemic in West Africa, its economy was damaged by USD 53 billion, and its GDP in 2015 decreased by 20%. This epidemic has taught us that while the health impact of an epidemic is limited, its economic consequences can be devastating and prolonged [1].

In 2020, the Covid-19 pandemic will affect all countries and communities. The entire world is struggling with the outbreak. As of September 2020, there are over 27 million cumulative confirmed cases, and the total number of confirmed COVID-19 deaths is around 880 thousand in 185 countries [3]. Financial uncertainty and substantial economic loss of up to trillions of dollars are evident. With the diseases that high contagious and has no treatment, it is uncertain whether and when the economy and social life will return to normal globally. Even if the novel coronavirus is clinically similar to the previous pandemic agent (SARS), the economic implications of the two epidemics are pretty different. Therefore, the economic effect of the current pandemic should be assessed individually [4,5]. The current pandemic has shown us that health and economy are integral parts of social welfare maximization. Therefore, the economic dimensions of the epidemic are essential issues to be examined as to its health features. Furthermore, the World and Turkey are facing to face with an unprecedented earlier economic crisis. Therefore, financial measures to prevent the crisis should be considered, and medical and public health measures to control the outbreak [6].

Costs incurred due to the outbreak can be defined as direct and indirect costs [7]. Direct costs arise from outbreak-related expenses. They are Medical: Costs associated with screening and diagnostic testing, outpatient visits, hospitalizations, laboratory tests, prescription drugs, and over-the-counter drugs paid by a third party or out-of-pocket medical equipment, medical staff costs, and resources for medical care. And Nonmedical: Special education and rehabilitation travel to seek care and paid caregiver services.

On the other hand, Indirect costs express the production and efficiency losses that would arise due to disease or disability during the epidemic. Indirect costs include the price for the disabled and the loss emerging from not participating in actual production for the care providers. Indirect costs emerging from panic are costs arising from alterations of masses on consumption, display, and expectations to lead to a contraction of the economy. Groups are eager to stock foodstuffs, slow down or stop production activities, and investments stop and drop productivity.

Regarding this, the epidemic is not only a medical and public health problem but an economic problem. Since the indirect cost of the outbreak (panic costs and total production loss per day) is much higher than the direct (medical and non-medical) costs of the epidemic, it is necessary to look at the expenses of panic in detail and understand the dimensions and dynamics of the indirect panic cost [7]. To understand the destroying effect on the health care expenses, we summarize the impact of COVID-19 on health expenditures in European countries and Turkey in particular. This brief study evaluated the Turkish population, COVID cases, course of the diseases, and health expenses compared to European data.

## Methods

### Data source

This is a cross-sectional study conducted to analyze Turkey's and Europe countries' coronavirus and health expenditures data. Coronavirus statistics dated 15/12/2021 were taken from the Worldometer digital database. In addition, socio-demographic data and health-related indicators of European Union Countries and Turkey have been obtained from the OECD (Organization for Economic Co-operation and Development) digital database for the year 2020 [8]. Also, Turkish National Databases on Economic and Finance references such as Turkish National Strategy and Budget Presidency [9] and Turkish Statistical Institute [10] were used.

## Data analyzed

Incidence: Total number of COVID-19 cases per one million population, number of COVID-19 tests per one million population, mortality rate: number of deaths from COVID-19 per one million population, annual health expenditure per capita (in dollars), gross the share of national product (GNP) allocated to health, and the number of doctors per thousand people. General data for 2020 was collected. To compare the disease's spread rate and the damage it caused, the entire case and total death rates and the new cases that emerged in the last seven days, and the deaths and rates of covid disease in the previous week were examined.

## Statistical analysis

Descriptive data and the tables were created with the MS Excel program. IBM SPSS (SPSS Inc., Chicago, IL, USA) v.20 package program was used for statistical analysis. The relations between the countries' data were evaluated with Spearman and Pearson correlation analysis. The upper limit of the alpha error rate in the study was 5%.

## Results

By the date when data investigation of the present study was held, as of 15/12/2021, the total number of COVID-19 cases was 9209740 in Turkey and 81556853 in the European Union countries. The three countries with the highest number of cases in the European Union were the United Kingdom (11,542,143), France (8,713,756), and Germany (6,869,495). The three countries with the highest number of deaths due to COVID19 were the United Kingdom (147,573), France (122,116), and Germany (110,234), respectively. It has been observed that European countries are ahead of Turkey both in terms of health expenditure per capita and the share of GNP allocated to health (in terms of amount and ratio).

The three countries with the highest elderly population were Germany (22.9%), Greece (22.4%), and Italy (22.0%), while the three countries with the lowest elderly population were Estonia (20.9%), Ireland (13.86%), and Luxembourg (14.35%). Turkey has a lower elderly population (9.5%) than European countries. Various Covid disease-related data and general health indicators, proportioned to the countries' populations, the elderly population rates of the nations, the ratio of physicians in the population, and annual doctor visits of individuals are presented in Table 1.

**Table 1.** Comparison of Covid-19 data and general health indicators of Turkey and European Union countries

Population and COVID-19 Case Parameters (n)	Turkey	Europe
Total population	85.672.389	445.848.883
Elderly population rate (%)	9.583	21.86
Total cases	9.209.740	81.556.853
Total case/1M pop	107.500	135.525
Cases in the last seven days	129.29	108.722
Cases in the last 7 days/1M pop	1.509	3.195
Weekly case change	-7.327	209.271
Weekly case % change	-5%	8%
Total deaths	80788	1,496,579
Deaths in the last 7 days	1.275	24.671
Total death/1M pop	943	32.143
Deaths in the last 7 days/1M pop	15	0
Weekly Deaths Change	-13	-2089
Weekly Death % Change	-1%	-8%
Total test number	115.079.943	919.237.867
Total test number / 1M pop	1.343.256	8.790.27
GDP per capita (US dollars)	7.715	28.446
Health expenditure per capita (US dollars)	1.267	4.088
Ratio of health expenditure to GDP (%)	6.089	6.958
Physicians (per 1000 people)	1.872	3.859
Average annual doctor visits per person	8.9	7.0

1M pop: per one million of population, GDP: global income distribution

A positive correlation was found between the society's covid case incidence, the elderly population, and the number of tests applied. On the other hand, a strong negative relationship was found between the share of countries in health expenditures and the weekly death rates, the number of doctors per thousand people, and the weekly death rates (Table 2).

**Table 2.** Correlations of Covid-19 data and general health indicators of Turkey and European Union countries

Correlations	r	P	
Total case/1M pop	Total test number / 1M pop	0.751	0.027*
Total case/1M pop	Elderly population rate (%)	0.452	0.107
Weekly Deaths Change	Total test number / 1M pop	-1	0.017*
Weekly Deaths Change	Health expenditure per capita	-1	0.025*
Weekly Deaths Change	Physicians (per 1000 people)	-1	0.213

Spearman and Pearson Correlation tests. \*Significance at the  $p < 0.05$  level. 1M pop: per one million of population.

## Discussion

Throughout all phases of the pandemic, countries' economies and health systems face numerous challenges caused by the coronavirus. To guarantee the efficient continuation of healthcare services, the importance of the economic balance cannot be overstated. Globally, debate continues over who should be evaluated for COVID-19 and at what rate. Countries of many sizes followed numerous different methodologies in the pandemic period. Some choose to screen a large part of the population, while others only screen those with symptoms and risk factors. Undoubtedly, the most critical factor in this election was the economic reasons and the adequacy of the country's health system.

Countries such as Japan, Canada, and Australia are among the countries that do not think that it is possible to relax the level of attention in monitoring and detecting covid cases; therefore, they apply a high amount of testing in direct proportion to the incidence in the society [11,12]. Our analysis found that the test rate was related to the incidence of the disease and the elderly population. Furthermore, it was found that the number of tests performed and the decrease in the number of deaths in the last week were inversely related. Undoubtedly, the high share of the state budget allocated to health expenditures should also affect the screening program to become widespread. Therefore, the welfare level of the countries influences the widespread use of screening tests and the policy of detecting every suspected case. We found that as the share allocated by the state to health expenditures increases and the number of doctors per capita increases, mortality rates decrease. With further reports, the world literature will provide more accurate strategies in the fight against pandemics as the effects of factors such as the increase in test numbers and the share allocated to health expenditures are revealed.

## Limitations

The present study is a cross-sectional study that tries to examine the relationship between the course of the covid disease and the share of health expenditures between countries. The inadequacy of data for some countries is one reason that reduces the strength of the analysis. Nevertheless, frequencies related to the disease, general information about the population, and available rates of health expenditures were taken in the study. To answer the question in the present study, it would be more valuable to elaborate on multiple factors; for example, the rate of compliance with the general pandemic rules of the society, the risk population rates, the details of health expenditures, the threshold value of inpatient treatment, the number of intensive care units.

## Conclusion

Covid has been studied extensively since it first emerged. Research has focused on understanding the microbial origins of the disease, its transmission and spread, and treatment protocols. However, little is known about the impact of economic and socio-demographic features on the COVID-19 disease spread. Therefore, it will be necessary to conduct retrospective and cross-sectional studies specific to the above topics in this context. In Europe, there is a more significant proportion of elderly individuals than in Turkey. The number of disease cases is higher, and a gradual decline in the number of cases will be caused by the increase in healthcare expenditures for preventing and treating the disease.

**Conflict of Interest:** None

	Author Contributions	Author Initials
SCD	Study Conception and Design	FTS, CS
AD	Acquisition of Data	FTS, CS
AID	Analysis and Interpretation of Data	FTS, CS
DM	Drafting of Manuscript	FTS, CS
CR	Critical Revision	FTS, CS

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