The Effects of Health Expenditures on Health Outcomes in Türkiye

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Abstract

Aim: In this study, time series and regression analyses were conducted to understand and explore the impact of both public and private health expenditures on health outcomes in Türkiye.

Methods: In the study, life expectancy at birth, human development index, disability-adjusted life years per 100,000 people, and share of total health expenditures in Gross Domestic Product (GDP) were employed as dependent variables. Total public and private health investments, current health expenditures for hospitals, current health expenditures for retail sales, and other medical equipment providers were used as independent variables. The data included the period between 2002 and 2019.

Results: The results confirm the positive impact of health expenditures in Türkiye, especially public and private health investments, and hospital current expenditures on the burden of disease. However, surprisingly, the results revealed that both public and private health expenditures had no impact on life expectancy at birth, the Human Development Index, or the share of total health expenditures in GDP. As a significant finding, this study demonstrated that public and private health investments and current hospital expenditures in Türkiye have shown improvements in disease burdens, indicating that investment decisions in this area are crucial in terms of both short-term and long-term benefits.

Conclusion: These results support the efforts of the country to create a sturdy, objective, and proof-based decision-making process.

Keywords: Health outcomes, health expenditures, public health expenditures, private health expenditures.

Türkiye'deki Sağlık Harcamalarının Sağlık Sonuçları Üzerine Etkisi

Öz

Amaç: Bu çalışmada, Türkiye'de hem kamu hem de özel sağlık harcamalarının sağlık sonuçları üzerindeki etkisini anlamak ve incelemek için zaman serisi ve regresyon analizleri yürütülmüştür.

Yöntem: Çalışmada, doğumda beklenen yaşam süresi, insani gelişme endeksi, 100.000 kişi başına engellilik ayarlı yaşam yılı ve toplam sağlık harcamalarının Gayri Safi Yurtiçi Hasıla (GSYH)'daki payı bağımlı değişkenler olarak kullanılmıştır. Toplam kamu ve özel sağlık yatırımları, hastaneler için cari sağlık

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harcamaları, perakende satışlar için cari sağlık harcamaları ve diğer tıbbi ekipman sağlayıcıları bağımsız değişkenler olarak kullanılmıştır. Veriler 2002 ile 2019 arasındaki dönemi kapsamaktadır.

Bulgular: Sonuçlar, Türkiye'de sağlık harcamalarının, özellikle kamu ve özel sağlık yatırımlarının ve hastane cari harcamalarının hastalık yükü üzerindeki olumlu etkisini doğrulamaktadır. Ancak, şaşırtıcı bir şekilde, sonuçlar hem kamu hem de özel sağlık harcamalarının doğumda beklenen yaşam süresi, insani gelişme endeksi ve toplam sağlık harcamalarının Gayri Safi Yurtiçi Hasıla (GSYH)'daki payı üzerinde hiçbir etkisinin olmadığını ortaya koymuştur. Önemli bir bulgu olarak, bu çalışma Türkiye'de kamu ve özel sağlık yatırımlarının ve hastane cari harcamalarının hastalık yüklerinde iyileşme gösterdiğini ortaya koymuştur; bu da bu alandaki yatırım kararlarının hem kısa hem de uzun vadeli faydalar açısından önemli olduğunu göstermektedir.

Sonuç: Bu sonuçlar ülkenin sağlam, nesnel ve kanıta dayalı bir karar alma süreci oluşturma çabalarını desteklemektedir.

Anahtar Sözcükler: Sağlık sonuçları, sağlık harcamaları, kamu sağlık harcamaları, özel sağlık harcamaları.

Introduction

The development level of a country is determined by its educational status, income level of individuals, and health indicators. The good health status of a country creates the conviction that people will contribute to production due to their good health and that their physical, social, and economic environment will be good[1]. However, the fact that countries have an exemplary health system is not restricted to the treatment of various diseases, investment in health services is also important in terms of both short and longtime advantages[2].

The literature is insufficient regarding the strength of the relationship between health expenditures and health outcomes. The difficulty in determining the impact of health system inputs on outcomes arises from the heterogeneity of healthcare services and the fact that there are many influences on outcomes[3]. Health expenditure can provide better amenities and opportunities, such as higher productivity in human capital and economic performance, due to its positive effects on health status[4]. Public expenditure on treatment services, emergency care and immunisation delivers important health outcomes in the form of reduced death rates[5]. For this reason, many non-governmental organizations are pressuring the government to increase expenditures on health services[6].

All countries in the world recognise the importance of the health system. For this reason, health expenditures have gradually increased around the world. In the world, it is seen

that health expenditures have a 10% ratio among the total Gross Domestic Product (GDP). Whereas the total portion of average health expenditure as a share of GDP in Organisation for Economic Co-operation and Development (OECD) countries was 7,8% in 2005, it has increased to 9,8% in 2020. In Italy, Portugal, The United Kingdom, Korea and Germany health expenditures increased from 8.3, 9.7, 7.8, 4.6 and 8.4, and per cent in 2005 to 9.7, 12.5, 9.8, 8.4 and 12.8 per cent in 2020, respectively[7].

In Türkiye, the ratio of total health expenditure to GDP has followed a fluctuating course over the years; it increased in 2001, 2002, 2004, 2006, 2007, 2008 and 2012, and decreased in 2003, 2010 and 2011[8]. As of 2012, the share of total health expenditures in GDP was 5.4%, 4.9% in 2021 and 4.0% in 2022. According to Turkish Statistical Institute (TUIK) data, the ratio of current health expenditure to GDP was calculated as 4.6% in 2021 and 3.7% in 2022[1]. Total health expenditure increased by 71.5% in 2022 compared to the previous year and increasing 606 billion 835 million TL. General government health expenditure increased by 65.4% and reached 463 billion 516 million TL. Private sector health expenditure was estimated at 143 billion 319 million TL with an increase of 94.4%. While per capita health expenditure in Türkiye was 4,206 TL in 2021, it increased by 69.8% to 7,141 TL in 2022[9]. The fact that existence of the rapid rise in health expenditures requires a necessity to research whether such expenditures improve health outcomes in Türkiye.

There is a lack of macro-level evidence on the advantages of increased health system expenditures. The heterogeneity of health services and their multiple effects on outcomes further increases the difficulty of determining the impact of health system inputs on outcomes[8]. There are different results in the existing literature regarding the effects of health expenditure on health outcomes

Previous Studies

Many studies conducted in the 1990s revealed that the contribution rate of public health expenditures to health status, measured through infant and child mortality, was statistically little significant or insignificant Share of health expenditures due to income increase, quality improvements in health As and technological developments increase, decreases in the infant mortality rate can be observed. infant mortality rate The decline causes people's concerns about being childless to decrease and birth rates to decrease causes[10,11]. Studies by Carrin and Politi (1995) and Filmer and Pritchett (1997) found that an individual's income status is a key determinant of health status indicators[12,13]

However, they could not find that public health expenditure had a statistically significant effect on these indicators. These results were also supported by Demery and Walton (1998). In their study, they reported that public expenditures are a weak indicator of health[14]. On the other hand, Anand and Ravallion (1993) and Bidani and Ravallion (1997) found that public health expenditure had a statistically significant effect on these indicators[15,16].

Some studies demonstrated that health expenditure has positively contributed to health outcomes regarding long-life expectancy and low levels of child death aspects[17,18]. For example, Kim and Lane (2013) and Karaman et al., in their studies with OECD countries, determined that health expenditures have a positive effect on life expectancy and maternal and infant mortality[11,19]. However, some studies conducted in European countries did not find any relationship between health expenditures and mortality rate[20]. Even though research based on a literature review has concluded that establishing a connection between health expenditure and health outcomes (life expectancy) was difficult, some researchers indicated that there was no significant relationship between health expenditure and health status[21,22]. Through this study, it was concluded that increases in health expenditures can positively and significantly affect health outcomes in developing countries where death rates connected to preventable infectious diseases are high[23]. Asiskovitc's 2010 study analysed the effect of health expenditures on life expectancy at birth by gender in 19 developed countries between 1990 and 2005. The study found that for 19 countries, the average effect of public and private financing types on life expectancy at birth for women and men was equal to 0.10 (out of 2.92) and 0.08 (out of 4.09) years, respectively. On life expectancy at birth, this research accepts the results of previous studies recommending that in developed economies health expenditure is a relatively marginal factor in life expectancy at birth[24]. Onfrei et al. (2021) empirically analyzed the relationship between public health expenditure and health results in developing European Union countries. Through the combination of regression analysis and factor analysis, they determined that public health expenditure and health outcomes are in balance in the long term, and the status of health expenditure could improve life expectancy and reduce baby deaths[25].

Tanaka et al. (2022), using panel data covering the years 1990-2014 for 140 countries, reported that diversity in health expenditures has no effect on reducing mortality rates. They also reported that there is a very weak relationship (elasticity less than 0.08) between health expenditures and health source and health service utilisation, and this

relationship is close to 0 in low-income countries. In addition, they stated that in countries where the share of out-of-pocket expenditures is higher, the use of health resources and services is significantly lower. In line with the findings of their study, they stated that health expenditures have no impact rather than ineffectiveness of health services. In their study, they also stated that the GDP ratio is significantly related to increased health sources, higher service utilisation rates, and lower mortality rates[26].

Using panel data for 29 OECD countries, Christopoulos and Eleftheriou (2020) revealed that health expenditures have a significant impact on income growth and health outcomes[18]. Aydan et al. (2021) examined the health services and social expenditures of OECD countries and found that the expenditures had an impact on health outcomes[27].

Using panel data from 1996 to 2020, Anwar et al. (2023) investigated the effects of health expenditure in 38 OECD countries on health results. As a result, they found that health expenditure has negatively affected baby deaths while positively affecting life expectancy, the income measuring as GDP, doctor quantity, and air pollution have negative effects on baby deaths, therefore, the variables mentioned had positive impacts on the life expectancy in the countries examined[28].

Tüylüoğlu and Tekin (2009) tried to determine the effect of income level and health expenditures on the variables of 176 international countries in 2003 by multiple regression analysis. In the study, they determined that the effect of health expenditures on life expectancy and the infant mortality rate is more effective than income level[29].

Using the data belonging to 35 different OECD countries, Şener and Yiğit (2019) examined the effects of health expenditure on health outcomes through the structural equation model. In this study, they stated that the number of nurses has positively and statistically meaningfully affected the health expenditure whereas the number of doctors and the number of computed tomography positively affected health expenditure, but the number of beds negatively affected. Even though the number of beds has a negative effect on health expenditure, this impact was statistically unmeaningful. Besides, as the result of the study, they concluded that health expenditure has positively affected the length of life whereas it negatively affected the baby death rate, and the rising of health expenditure has also affected the health level positively[30].

Ata and Eryer (2021) analysed the effect of health expenditures and income status of Mexico, Indonesia, Nigeria, and Türkiye between 2000 and 2018 on health status via

panel data econometric estimations. In their study, they concluded that the observed rise in countries' health expenditures has a positive effect on health status, whereas inequality in income distribution negatively affects health status[1].

In their study covering the period 1980-2015, Yumuşak and Yıldırım (2009) analysed the relationship between health expenditures, life expectancy at birth, and GNP in Türkiye by using the Co-Integration and Error Correction Model method. As a result of the study, they determined that there is a long-run relationship between health expenditures, life expectancy at birth, and GNP and that there is a unidirectional causality relationship from health expenditures to GNP and from life expectancy at birth to GNP[31].

Material and Methods

In this study, the time series and regression analysis methods were used to understand and explore the effect of public health expenditure and private health expenditure on health outcomes.

Data on Türkiye's health status and indicators of health expenditures by service providers were obtained from TUIK, the Ministry of Health Statistical Yearbook and the United Nations Development Programme website. Since the relevant variables for all years were not available in the databases, only the data for the period 2002-2019 were included in the study. In the study, life expectancy at birth, human development index, disability-adjusted life years per 100,000 people (DALY-Burden of Disease), share of total health expenditures in GDP were used as dependent variables, while total public and private health investments, current health expenditures hospital, current health expenditures retail sales and other medical equipment providers were used as independent variables (Table 1). Since the independent variables are in price terms, the logarithms of these variables have been taken.

Table 1. Variables used in the study

Dependent Variables	
Y1	Life Expectancy
Y2	Human Development Index
Y3	DALY per 100 000 people (Burden of Disease)
Y4	Share of Total Health Expenditure in GDP

Independent variables	
X1	State total Health investments (Logarithm)
X2	State total current health expenditure hospital (Logarithm)
X3	State total current health expenditure retail (Logarithm)
X4	Total private sector health investments (Logarithm)
X5	Private sector total current health expenditure hospital (Logarithm)
X6	Private sector total current health expenditure retail (Logarithm)

In time series, the stationarity of the series at the same level is an important criterion in terms of both the consistency of the analyses and the fact that the findings reflect the actual relationship/effects. In this study, the ADF Augmented Dickey Fuller test was implemented for the stationarity of the series. Test statistic

$$\Delta Y_t = \beta_0 + \beta_1 t + \delta Y_{t-1} + \alpha_i \sum_{i=1}^{m} \Delta Y_{t-i} + \varepsilon_t \quad (1)$$

It is given by the equation. In the ADF test, if the null hypothesis is rejected for the value of k=0,1,2,3... it is decided that the series is stationary for the relevant level[32].

Regression analysis aims to obtain the model of the relationship between the dependent variable and independent variables and to make predictions through the model obtained. ANOVA (F) test is performed for the significance of the regression model. In regression analysis, the percentage of explanation of the independent variable in the dependent variable is expressed by the adjusted coefficient of determination (adjusted R-square). Whether the coefficients (Beta coefficient) of the variables in the regression model are statistically significant or not is examined by the student-t test[32].

In the study, 4 models were established and analysed to determine the effects of health expenditures on health outcomes.

The first model 1a is constructed for the effect of government total health investments, government total current health expenditures (hospital) and government total current health expenditures (retail) variables on life expectancy at birth.

Model 1a: $DY_{1t} = \alpha + \beta_1 X_{1t} + \beta_2 X_{2t} + \beta_3 X_{3t}$

The first model 1b is constructed for the effect of private total health investments, private total current health expenditures (hospital) and private total current health expenditures (retail) variables on life expectancy at birth.

Model 1b: $DY_{1t} = \alpha + \beta_1 X_{4t} + \beta_2 X_{5t} + \beta_3 X_{6t}$

The second model 2a is constructed for the effect of government total health investments, government total current health expenditures (hospital) and government total current health expenditures (retail) variables on the human development index.

Model 2a: $DY_{2t} = \alpha + \beta_1 X_{1t} + \beta_2 X_{2t} + \beta_3 X_{3t}$

The second model 1b is constructed for the effect of private total health investments, private total current health expenditures (hospital) and private total current health expenditures (retail) variables on the human development index.

Model 2b : $DY_{2t} = \alpha + \beta_1 X_{4t} + \beta_2 X_{5t} + \beta_3 X_{6t}$

The third model 3a is constructed for the effect of state total health investments, state total current health expenditures (hospital) and state total current health expenditures (retail) variables on DALY per 100,000 people.

Model 3a: $DY_{3t} = \alpha + \beta_1 X_{1t} + \beta_2 X_{2t} + \beta_3 X_{3t}$

The third model 3b is constructed for the effect of private total health investments, private total current health expenditures (hospital) and private total current health expenditures (retail) variables on DALY per 100,000 people.

Model 3b : $DY_{3t} = \alpha + \beta_1 X_{4t} + \beta_2 X_{5t} + \beta_3 X_{6t}$

The fourth model 4a is constructed for the effect of government total health investments, government total current health expenditures (hospital) and government total current health expenditures (retail) variables on the share of total health expenditures in GDP.

Model 4a: $DY_{4t} = \alpha + \beta_1 X_{1t} + \beta_2 X_{2t} + \beta_3 X_{3t}$

The fourth model 4b is constructed for the effect of private total health investments, private total current health expenditures (hospital) and private total current health expenditures (retail) variables on the share of total health expenditures in GDP.

Model 4b : $DY_{4t} = \alpha + \beta_1 X_{4t} + \beta_2 X_{5t} + \beta_3 X_{6t}$

Results

Descriptive statistics of the variables used in the study are given in Table 2.

Table 2. Descriptive statistics of variables

	X1	**X2**	**X3**	**X4**	**X5**	**X6**	**Y1**	**Y2**	**Y3**	**Y4**
Average	3.457	4.379	4.166	2.929	3.564	3.665	75.26	0.760	24044	4.844
Median	3.476	4.384	4.189	3.018	3.384	3.632	75.45	0.755	24063	4.700
Maximum	4.025	4.895	4.603	3.343	4.276	4.071	78.60	0.842	26383	5.800
Minimum	2.646	3.726	3.725	2.375	2.871	3.246	71.80	0.684	21754	4.400
Std. Deviation	0.386	0.326	0.225	0.318	0.458	0.228	2.392	0.056	1007	0.403
Skewness	-0.597	-0.304	-0.071	0.343	0.120	-0.074	-0.019	0.135	0.014	1.138
kurtosis	2.624	2.281	2.687	1.731	1.540	2.375	1.394	1.470	4.255	3.112
Jarque-Bera	1.176	0.663	0.088	1.560	1.640	0.309	1.933	1.808	1.182	3.900
p	0.555	0.717	0.956	0.458	0.440	0.856	0.380	0.404	0.553	0.142

According to the findings, life expectancy at birth is 75.27 years, human life index value is 76%, DALY is 24,044 per 100,000 population and the share of total health expenditures in GDP is 4.8% for the period analysed. In addition, the normality of the data was analysed by Jarque-berra test and it was decided that all variables were suitable for normal distribution.

The findings obtained by examining the stationarity of the variables used in the study with the ADF unit root test are given in Table 3. Accordingly, all variables were found to be stationary at first difference. In accordance with the obtained finding, all variables were used in regression analyses for the effect of independent variables on the dependent variable by taking the first difference of all variables (stationarised).

Table 3. Examination of the stationarity of variables with ADF unit root test

	Level		First difference	
	t-Statistic	Prob,*	t-Statistic	Prob,*
Y1	-0.54683	0.8585	-3.82179	0.0121
Y2	0.045026	0.9506	-3.42864	0.0255

Y3	-2.86003	0.0723	-3.19559	0.0394
Y4	-1.42656	0.5448	-5.84064	0.0020
X1	-1.79708	0.3690	-4.45372	0.0036
X2	-2.28505	0.1872	-3.97914	0.0089
X3	-0.43687	0.8815	-3.15382	0.0426
X4	-1.60238	0.4598	-3.15382	0.0426
X5	-0.42051	0.8847	-5.16534	0.0009
X6	-0.52263	0.8638	-3.76921	0.0142
Test critical values:				
1% level	-3.88675		-3.92035	
5% level	-3.05217		-3.06559	
10% level	-2.66659		-2.67346	

The effects of public and private health expenditure used in this study on life expectancy were examined through regression analysis and the findings were presented in Table 4. According to the findings, Model 1a and Model 1b were found statistically insignificant (F=0.629; F=0.566; p>0.05). According to this result, it is decided that both public and private health expenditures used in the study have no effect on life expectancy.

Table 4. Regression analysis results for the effect of public and private health expenditure variables on life expectancy at birth

		Regression coefficients	**Standard regression coefficients**	**t**	**p**
State Health Expenditure	Fixed	0.440		1.479	0.163
	X1	-1.526	-0.307	-1.069	0.305
	X2	4.212	0.297	0.921	0.374
	X3	-3.986	-0.287	-0.975	0.347
	R	R square	Corrected R squared	F	p
	0.356	0.127	-0.075	0.629	0.609

Private Health Expenditure	Fixed	0.623		2.146	0.051
	X4	0.951	0.402	1.152	0.270
	X5	-1.868	-0.378	-1.171	0.263
	X6	-2.397	-0.165	-0.557	0.587
	R	R square	Corrected R squared	F	p
	0.340	0.115	-0.089	0.566	.647[b]

Through regression analysis used in this study, the effects of public and private health expenditure variables on the human development index were analyzed. The findings regarding the analysis results are shown in Table 5. According to the findings, Model 2a and Model 2b were found statistically insignificant (F=1,.52; F=0.112; p>0.05). According to this result, it is decided that both public and private health expenditures used in the study have no effect on the human development index.

Table 5. Regression analysis results for the effect of public and private health expenditure variables on human development index

		Regression coefficients	**Standard regression coefficients**	**t**	**p**
State Health Expenditure	Fixed	0.014		3.998	0.002
	X1	-0.002	-0.029	-0.108	0.916
	X2	-0.007	-0.042	-0.138	0.892
	X3	-0.077	-0.448	-1.612	0.131
	R	R square	Corrected R squared	F	p
	0.474	0.224	0.045	1.252	0.331
Private Health Expenditure	Fixed	0.010		2.571	0.023
	X4	0.006	0.194	0.528	0.606
	X5	-0.007	-0.119	-0.351	0.732
	X6	-0.003	-0.015	-0.047	0.964
	R	R square	Corrected R squared	F	p
	.159	0.025	-0.200	0.112	.951

The effect of public and private health expenditure variables used in the study on DALY (Burden of Disease) per 100,000 people was analysed by regression analysis and the

findings are given in Table 6. According to the findings, Model 3a and Model 3b were found statistically significant (F=8.336; F=4.999; p<0.05). The coefficient of determination (adjusted R-square) value for Model 3a was calculated as 0.579. According to this, 57.9% of the variability in the dependent variable is explained through the linear regression analysis by three independent variables in the model. The t statistics for the effect of the variables indicated that the effect of the state health investments variable was significant at 5%, and the effect of the state hospital current expenditures was also significant at a 10% significance level. The fact that the effect coefficients of both variables are negative indicates that these variables have a negative (decreasing) effect on the DALY (Burden of Disease) variable per 100 000 people. The coefficient of determination (adjusted R-square) value for Model 3b was calculated as 0.428. According to this, 42.8% of the variability in the dependent variable is explained through the linear regression analysis by three independent variables in the model. When the t statistic values for the effect of the variables were analysed, the effect of the private sector health investments variable was found significant at 5% significance level. The fact that the effect coefficient of the private health investments variable is negative indicates that this variable has a negative (decreasing) effect on the DALY per 100 000 (Burden of Disease) variable.

Table 6. Regression analysis results for the effect of public and private health expenditure variables on DALYs per 100 000 population

		Regression coefficients	**Standard regression coefficients**	**t**	**p**
State Health Expenditure	Fixed	545.897		2.120	0.054
	X1	-4221.309	-0.615	-3.418	0.005
	X2	-7268.098	-0.371	-1.836	0.089
	X3	3158.786	0.165	0.893	0.388
	R	R square	Corrected R squared	F	p
	0.811	0.658	0.579	8.336	0.002
Private Health Expenditure	Sabit	-372.367		-1.280	0.223
	X4	-2959.505	-0.906	-3.578	0.003
	X5	1556.489	0.228	0.974	0.348
	X6	5362.402	0.268	1.243	0.236
	R	R square	Corrected R squared	F	p
	.732	0.536	0.428	4.999	.016

Table 7 presents the findings regarding the impact of public and private health expenditure variables examined by regression analysis on the share of total health expenditures in GDP. According to the findings, Model 4a and Model 4b were found statistically insignificant (F=0.020; F=0.741; p>0.05). According to this result, it is decided that independent variables have no effect on the share of total health expenditures in GDP, both public and private.

Table 7. Regression analysis results for the effect of government and private health expenditure variables on the share of total health expenditure in GDP

		Regression coefficients	**Standard regression coefficients**	**t**	**p**
State Health Expenditure	Fixed	-0.017		-0.110	0.914
	X1	0.040	0.017	0.055	0.957
	X2	-0.525	-0.078	-0.226	0.824
	X3	0.388	0.059	0.187	0.855
	R	R square	Corrected R squared	F	p
	0.068	0.005	-0.225	0.020	0.996
Private Health Expenditure	Sabit	-0.180		-1.330	0.206
	X4	-0.513	-0.457	-1.331	0.206
	X5	0.723	0.308	0.971	0.349
	X6	2.411	0.350	1.199	0.252
	R	R square	Corrected R squared	F	p
	.382	0.146	-0.051	0.741	.546

Discussion

According to the findings, life expectancy at birth is 75.27 years, human life index value is 76%, DALY is 24 044 per 100 000 population and the share of total health expenditures in GDP is 4.8% for the period analysed. A higher GDP per capita; It helps individuals have the opportunity to have their diseases treated and improve their health by having a higher income[28]. The life expectancy at birth is a main indicator used to estimate health outcomes and the inequality in health. While the life expectancy at birth as an indicator for health services presents only an element of social health outcomes and individuals' health statuses, it is seen as a measurement that can be used in many

countries over time[33]. The health outcomes measured as life expectancy at birth are mostly connected to economic development.

On average, individuals in high-income countries have longer and healthier lives and lower death rates[34,35]. DALY is the most comprehensive measure that evaluates health status in terms of both morbidity and mortality and takes into account all factors affecting health[36]. Disability-adjusted health expectancy (DALE) rankings of countries in the World Health Report, 2000, placed wealthier countries, which generally have large public sector involvement in health care, higher on the list[37]. Hypothesis that holds that regardless of a country's method of financing its health system, the higher its health expenditures, the better its health outcomes. This hypothesis is supported by Hadley (1982), Thornton (2002) and OECD's DALY ranking in the 2000 World Health Report[38,39]. DALY rates have shown a continuous decline from 2000 to 2016 in 176 countries. DALY rates decreased from 46 495 per 100 000 population in 2000 to 34 280 in 2016[39].

The effects of public and private health expenditure used in this study on life expectancy were found statistically insignificant. According to this result, it is decided that both public and private health expenditures used in the study have no effect on life expectancy. Contrary to our study, studies have found that health expenditures have a positive effect on life expectancy at birth[11,19]. Compared to 1970, the life expectancy at birth in OECD countries reached 81 in 2020 increasing by 10 years[8]. The improvement in life expectancy can be explained by better access to medical care. In addition, there may be policy decisions made on factors affecting health in order to support the health system. A study stated that OECD countries, including Türkiye, Australia, New Zealand, Ireland and the United Kingdom, have implemented comprehensive policies on tobacco use to increase life expectancy[8].

The increase in government expenditures on health investments not only enhances health facilities that decrease the risk of disease through timely and effective use of health facilities but also increases the burden of disease and life expectancy at birth[17]. On average, ischemic heart diseases and strokes in OECD countries were reduced by 47% and 52% in the era from 2000 to 2019, and this shows the importance of health expenditure in the countries examined[8]. In this respect, it has been determined that secondary healthcare services provide very little health gain. Similar to our study, Daroudi et al. found a non-linear inverse relationship between per capita health expenditure and DALYs[40].

Conclusion

The health expenditure is an essential prerequisite of health service performance. In our study, the effect of both public and private health expenditures on health outcomes was investigated by using life expectancy at birth in Türkiye, the human development index, DALYs per 100 000 people, and the share of total health expenditures in GDP as a proxy. Our study contributed to the literature determining the impact of public and private health expenditure on health outcomes in Türkiye. The results verified the positive impact of health expenditures in Türkiye, especially public and private health investments and current expenditures of hospitals, on disease burdens. However, surprisingly, the results revealed that public and private health expenditures had no effect on life expectancy at birth, the human development index, and the share of total health expenditures in GDP.

Based on the positive impact of health expenditures on health outcomes, the State must facilitate health services by constantly supporting them with health expenditures and policies to use health services and the general health system efficiently. Empowering the basics of the health system, increasing the number of health professionals such as doctors, and expenditure shares for health investments can lead to better health outcomes. However, the observed rise in health expenditure in almost every country causes serious concerns regarding long-term financial sustainability. Therefore, governments should focus on economic and environmental precautions to obtain positive and long-term health outcomes. Based on this purpose, governments should make evidence-based decisions when creating health policy to achieve efficient results at the least cost.

In this study, the life expectancy at birth, human development index, DALYs per 100 000 people (Disease Weight), and share of total health expenditures in GDP were used. Future studies can examine the other variables regarding health outcomes. In addition, analyzing the other variables, such as education, income inequality, unemployment, and lifestyle is significant. Therefore, future researcher should examine the effects of these socioeconomic variables on health outcomes. Such studies that make comparisons between developed and developing countries are also needed.

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REFERENCES

1. Ata AY, Eryer A. Sağlık statüsü üzerinde sağlık harcamaları ve gelir dağılımının etkisi: MINT ülkeleri üzerine bir inceleme. *Karadeniz Ekonomi Araştırmaları Dergisi*. 2021;2(2):32-49.
2. Reeves A, Basu S, McKee M, Meissner C, Stuckler D. Does investment in the health sector promote or inhibit economic growth? *Global Health*. 2013;23(9):43. doi: 10.1186/1744-8603-9-43.
3. Martin S, Rice N, Smith PC. Does healthcare spending improve health outcomes? Evidence from English programme budgeting data. *Journal of Health Economics*. 2018;27(4):826-842.
4. Albulescu C, Oros C, Tiwari AK. Is there any convergence ın health expenditures across EU countries? *Economics Bulletin*. 2017;37:2095-101.
5. Bein M, Coker-Farrell EY. The association between medical spending and health status: A study of selected African countries. *Malawi Med J*. 2020;32(1):37-44. doi: 10.4314/mmj.v32i1.8.
6. Andrews D, Boote AR, Rizavi SS, Singh S. Debt relief for low-ıncome countries. IMF Pamphlet Series No. 51, International Monetary Fund, Washington, DC; 1999;
7. Demirkıran M, Yardan ED, Yabana B. Türkiye sağlık harcamaları trendi. *Hitit Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*. 2016;9(1).
8. OECD (2021). Health Expenditure as a Share of GDP Website https://www.oecd.org/health/health-expenditure.htm [accessed 3 January 2024]
9. WHO. Countries are Spending More on Health, But People are Still Paying Too Much Out of Their Own Pockets. WHO (2019). https://www.who.int/news/item/20-02-2019-countries-are-spending-more-on-health-but-people-are-still-paying-too-much-out-of-their-own-pockets.
10. Eryer A, Ata AY. Sağlık harcamaları ve gelir dağılımının bebek ölüm hızı üzerine etkisi: oecd ülkeleri üzerine ekonometrik bir inceleme. *Kahramanmaraş Sütçü İmam Üniversitesi Sosyal Bilimler Dergisi*. 2024;21(1):174-189.
11. Kim TK, Lane SR. Government health expenditure and public health outcomes: a comparative study among 17 countries and ımplications for us health care reform. *American International Journal of Contemporary Research*. 2013;3(9):8-13. doi: 10.3390/ijerph182010725

12. Carrin G, Politi C. Exploring the health ımpact of economic growth, poverty reduction, and public health expenditure. *Tijdschrift voor Economie en Management*. 1995;40:227- 246.

13. Filmer D, Pritchett L. *Mortality and Public Spending on Health: How Much Does Money Matter?* Child World Bank, Washington, DC; 1997.

14. Demery L, Walton M. *Are Poverty Reduction and Other 21st Century Social Goals Attainable?* World Bank, Washington, DC; 1998

15. Anand S, Ravallion M. Human development in poor countries: on the role of private incomes and public services. *Journal of Economic Perspectives*. 1993;7(1):133-150. doi: 10.1257/jep.7.1.133

16. Bidani B, Ravallion M. Decomposing social indicators using distributional data. *Journal of Econometrics*. 1997;77(1):125-139. doi: 10.1016/S0304-4076(95)01809-3.

17. Karim DO. Health expenditure and economic growth nexus: an ARDL-type analysis for Nigeria. *Imperial Journal of Interdisciplinary Research*. 2016;2(2):516-29.

18. Christopoulos K. Eleftheriou K. The fiscal ımpact of health care expenditure: evidence from the OECD countries. *Economic Analysis and Policy*. 2020;67:195-202. doi: 10.1016/j.eap.2020.07.010

19. Karaman S, Ürek D, Bilgin Demir İ, Uğurluoğlu Ö, Işık O. The impacts of healthcare spending on health outcomes: New evidence from OECD countries. *Erciyes Medical Journal*. 2020;42(2).

20. Lippi G, Mattiuzzi C, Cervellin G. No correlation between health care expenditure and mortality in the European Union. *Eur J Intern Med*. 2016;32:e13-4. doi: 10.1016/j.ejim.2016.02.025

21. Mackenbach JP. Health care expenditure and mortality from amenable conditions in the European Community. *Health Policy*. 1991;19(2-3):245-55. doi: 10.1016/0168-8510(91)90011-l.

22. van Baal P, Obulqasim P, Brouwer W, Nusselder W, Mackenbach J. *The Influence of Health Care Spending on Life Expectancy*. Tilburg: Netspar - Network for Studies on Pensions, Aging and Retirement. 2013.

23. Deshpande N, Kumar A, Ramaswami R. The Effect of National Healthcare Expenditure on Life Expectancy. Georgia Institute of Technology; 2014.

24. Asiskovitch S. Gender and health outcomes: the impact of healthcare systems and their financing on life expectancies of women and men. *Soc Sci Med*. 2010;70(6):886-95. doi: 10.1016/j.socscimed.2009.11.018.

25. Onofrei M, Vatamanu AF, Vintilă G, Cigu E. Government health expenditure and public health outcomes: A comparative study among EU Developing Countries. *Int J Environ Res Public Health*. 2021;18(20):10725. doi: 10.3390/ijerph182010725.

26. Tanaka T, Okamoto S, Canning D. National health spending, health-care resources, service utilization, and health outcomes. *Am J Epidemiol*. 2022;191(3):386-396. doi: 10.1093/aje/kwab179.

27. Aydan S, Donar GB, Arıkan C. The effects of public health and social spending on health outcomes: A panel data analysis of OECD countries. *Hacettepe Journal of Health Administration*. 2021;24(3):469-482.

28. Anwar A, Hyder S, Mohamed Nor N, Younis M. Government health expenditures and health outcome nexus: a study on OECD countries. *Front Public Health*. 2023;11:1123759. doi: 10.3389/fpubh.2023.1123759.

29. Tüylüoğlu Ş, Tekin M. Gelir düzeyi ve sağlık harcamalarının beklenen yaşam süresi ve bebek ölüm oranı üzerindeki etkileri. *Çukurova Üniversitesi İktisadi Ve İdari Bilimler Fakültesi Dergisi*. 2009;13(1):1-31.

30. Şener M, Yiğit V. Sağlık sistemlerinin teknik verimliliği: OECD ülkeleri üzerinde bir araştırma. *Süleyman Demirel Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*. 2017;(26):266-290.

31. Yumuşak İG, Yıldırım DÇ. Sağlık harcamaları iktisadi büyüme ilişkisi üzerine ekonometrik bir inceleme. *Bilgi Ekonomisi ve Yönetimi Dergisi*. 2009;4(1):57-70.

32. Sevüktekin M, Nargeleçekenler M. *Ekonometrik Zaman Serileri Analizi*. Ankara: Nobel Akademik Yayıncılık; 2007.

33. Alpar R. *Uygulamalı Çok Değişkenli İstatistiksel Yöntemler*. Ankara: Detay Yayıncılık; 2013.

34. Joumard I, Andre C, Nicq C, Chatal O. Health Status Determinants: Lifestyle, Environment, Health Care Resources And Efficiency. Paris: OECD; 2008.

35. Akinkugbe O, Mohanoe M. Public health expenditure as a determinant of health status in Lesotho. *Soc Work Public Health*. 2009;24(1-2):131-47. doi: 10.1080/19371910802569716.

36. Guindon GE, Contoyannis P. A second look at pharmaceutical spending as determinants of health outcomes in Canada. *Health Econ*. 2012;21(12):1477-95. doi: 10.1002/hec.1415.

37. Sharmistha S, Grabowski R. how effective is public health expenditure improving overall health? A cross-country analysis. *Applied Economics*. 2003;35(7):835-845,

38. Hadley J. *More Medical Care, Better Health?* Urban Institute, Washington, DC; 1982

39. Thornton J. Estimating a health production function for the US: some new evidence, *Applied Economics*. 2002;34:59-62. doi: 10.1080/00036840010025650

40. Daroudi R, Akbari Sari A, Nahvijou A, Faramarzi A. Cost per DALY averted in low, middle- and high-income countries: evidence from the global burden of disease study to estimate the cost-effectiveness thresholds. *Cost Eff Resour Alloc*. 2021;19(1):7. doi: 10.1186/s12962-021-00260-0.