



Research Article

Ankara Med J, 2023;(3):269-283 // doi 10.5505/amj.2023.45077

DO HEALTHCARE REFORMS AFFECT HEALTH STATUS? TÜRKİYE PRACTICE

 **Hasan Bağcı**¹

¹ Freelance Researcher, Health Management, Ankara, Türkiye

Correspondence:

Hasan Bağcı (e-mail: hasanbagci@gmail.com)

Submitted: 11.09.2023 // Accepted: 25.09.2023



Abstract

Objectives: The aim of this study is to determine the impact of per capita health expenditure, the number of physicians, and the Health Transformation Program (HTP) implemented in Türkiye since 2003 on infant mortality.

Materials and Methods: In this study, while the infant mortality rate per 1,000 live births (IM) was used as the dependent variable, the per capita health expenditure in US dollars according to purchasing power parity (HEX), the number of physicians per 1,000 population (PHY), and the HTP were used as independent variables. The Autoregressive Distributed Lag (ARDL) bounds testing approach was used in this study. Data covering the years of Türkiye from 1975 to 2018 were obtained from the OECD health statistics database for HEX and PHY, and from the World Bank database for IM.

Results: According to the short and long term results of ARDL limit test, it was observed that the independent variables HEX, PHY and HTP reduced IM in the short term. However, it was found that the short-term results of independent variables HEX ($p=0.157$), PHY ($p=0.390$), and HTP ($p=0.420$) on IM were not statistically significant. According to the ARDL bounds test, the independent variables HEX, PHY, and HTP reduce IM in the long run. The long-term results of independent variables HEX ($p=0.007$), PHY ($p=0.004$) and HTP ($p=0.012$) on IM are statistically significant.

Conclusion: The independent variables HEX, PHY and HTP were shown to reduce IM in the long term ($p<0.05$). It is recommended to monitor these identified effects and to develop public health policies accordingly.

Keywords: Autoregressive distributed lag, ARDL, health expenditure, number of physicians, health transformation program, HTP, infant mortality rate.

Introduction

Since the 1990s, Türkiye has been implementing health reforms, and radical changes have been made in many related areas, from service delivery to financing and from workforce to information systems. A key turning point in these reform initiatives was the implementation of the Health Transformation Program (HTP), which began in 2003. HTP first evaluated the current situation of the Turkish health system and identified access to health services, qualified health personnel, service quality, financial protection, efficiency, management and organization, coordination, supervision, research, and development components as the key priorities.

While developing policy within the framework of HTP, the priority was the human-centered approach along with the concepts of access, quality, equity, and efficiency. Here are the basic principles used in policy development: sustainability, continuous quality improvement, participation, reconciliation, volunteerism, competitiveness in service, decentralization, and separation of powers.

HTP essentially aimed to bring the entire population under the health security umbrella, separate service provision and financing, and strengthen decentralization. For this purpose, automatization of hospital management, refocusing on preventive services and cost-effective primary care delivery, developing a more effective referral system and better management of human resources have been defined. The general purpose of the program is to increase management, effectiveness, user and supplier satisfaction and to ensure the long-term financial sustainability of the healthcare system in Türkiye.

The health transformation policy cycle in Türkiye comprises small cycles of change, and each major policy cycle needs to be accompanied by a subsequent cycle due to changing needs, expectations, resources and context.¹ The HTP consists of 8 primary parts, each explaining the program's objectives in detail.²

The planner and controller is the Ministry of Health: Instead of being directly involved in service provision with HTP, it has a planning and supervisory position by the principle of decentralization and has transferred the task of providing services to the Türkiye Public Health Institution and Türkiye Public Hospitals Institution, which are affiliated institutions. However, these institutions were later closed and became general directorates under the Ministry of Health. As a result of the provincial restructuring, the provincial public health directorates responsible for providing primary health care services were closed, and the general secretariats responsible for providing second and third-level health services were closed. These duties were transferred to the provincial health directorates.

Bringing everyone together under a single umbrella general health insurance: With the transfer of SSK health facilities to the Ministry of Health in February 2005, social security institutions withdrew from service provision. Ministry of Health and SSI hospitals have been combined under one roof. Thus, the Social Security Institution (SSI) focused on public health insurance and health financing issues, thus ensuring the complete separation of service-providing and financing institutions.

Another critical step in the health reform was taken in May 2006. The "Social Security Institution (SSI) Law No. 5502" provided the legal framework to combine the three existing social security systems (SSK, BAĞ-KUR and Retired Fund) under the SSI. In the Social Insurance and General Health Insurance Law No. 5510, health services offered to citizens at different standards were brought to a common standard, a compulsory universal health insurance system covering the whole society was established, and the scope and financing of health services for all citizens were unified. Both laws came into force in October 2008, after the Constitutional Court concluded their legal objections.³

Widespread, Accessible and Friendly Health Service System: The pilot implementation of family medicine in primary care services in Türkiye started in 2005, and its dissemination was completed in 2010. However, in most countries that practice family medicine, the average population per family physician is around 1,200; in Türkiye, this number is over 3,000. The low number of family doctors and the high population per family doctor did not make it possible to establish a compulsory referral system.⁴

The practice of family medicine, which has an essential place within the HTP, and the prioritization of preventive health services have resulted in positive developments in measurable indicators of maternal and infant health. Infant mortality per thousand live births and maternal mortality per hundred thousand live births are essential indicators of the general health status of a society. IM in Türkiye, which was 109 per thousand live births in 1975, dropped to 27‰ in 2002, the beginning of the HTP,⁵ and dropped to 9.1‰ in 2021.⁶ In 2020, IM in The Organisation for Economic Co-operation and Development (OECD) countries was 3.7, and in the European Union (EU) it was 3.2.⁶ In Türkiye, the maternal mortality ratio, which was 64 per hundred thousand live births in 2002, decreased to 13.1 in 2021. In 2020, the maternal mortality ratio was 9.8 per hundred thousand live births in OECD countries and 5.0 in the EU-22.⁶

Figure 1 shows a significant acceleration in the decrease in infant mortality. It decreased at a Compound Annual Growth Rate (CAGR) of 5% from 1975 to 2002, while it decreased at a CAGR of 6.5% from 2003 to 2018, when the SDP began. However, despite these impressive developments, Türkiye ranked 79th among 244 countries in the IM ranking 2018.

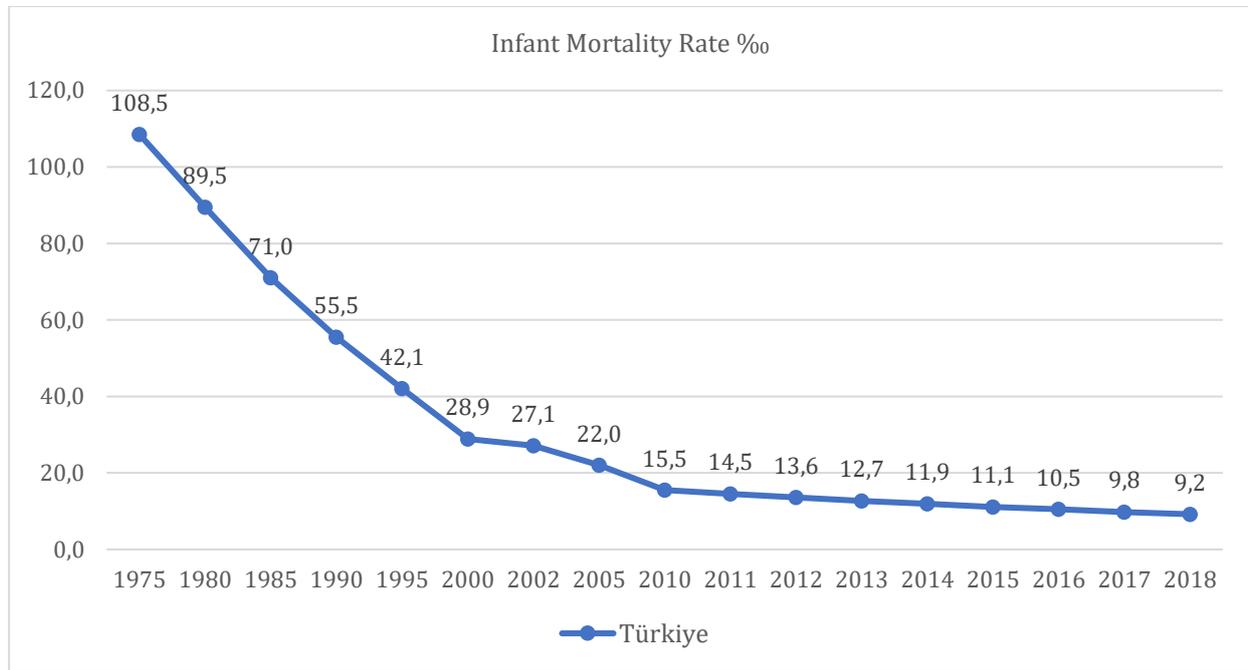


Figure 1. Infant mortality rate per thousand live births 1975-2018

While the number of applications to a physician per capita in Türkiye was 9.8 in 2019, it decreased by 26.5% to 7.2 (Ministry of Health, 2021). While 35.7% of applications to physicians in 2019 were made to institutions providing primary healthcare services, 64.3% were provided to secondary and tertiary healthcare institutions

Health Workforce that Is Knowledgeable, Competent, and Highly Motivated: According to the data from 2002 in Türkiye, there were approximately 93,586 doctors on duty, and the number of doctors per 1000 people was 1.34. There were 183,569 physicians across all sectors in Türkiye in 2021. Among these physicians, 51% were specialists, and 59% of all physicians worked in the ministry of health. Regarding PHY, Türkiye ranked last among OECD countries with 2.17 physicians, indicating a lower physician-to-population ratio than other OECD nations. PHY for 2020 is 3.93 in the OECD and 3.6 in the EU.⁶

Due to the limitations in the number of physicians, high figures have been reached in the number of outpatient clinic examinations per physician. Among OECD countries, Türkiye ranks second after South Korea, with the highest number of patients cared for per doctor. While the OECD average is 2,230 patient examinations per physician per year, physicians in Türkiye examine an average of 5,033 patients per year. The most critical problem in the Turkish healthcare system is healthcare personnel, both in quality and quantity.⁷

Institutions for science and education that support the system: The training of healthcare personnel is no longer seen as a one-time event that ends with graduation. On the contrary, education is defined as a lifelong

process that requires constant updating and in which professional values are regularly increased. Continuing professional development is gradually becoming a vital component of healthcare professional training.

Qualitative and Ethical Standards for Effective and Qualified Health Services: The Turkish Health Services Quality and Accreditation Institute (TÜSKA) was established in 2015 to carry out accreditation activities in health services.

Institutional Structure in the Management of Rational Medicine and Equipment: As a result of the studies, a reference pricing system was introduced, which takes into account the prices of the product in various comparison countries in order to determine a limit for the market entry price or reimbursement price of the product in the drug pricing system.⁸ The burden of pharmaceutical expenditures on both the public and citizens has been greatly eased. These regulations played an important role in expanding access to medicine.

Access to Effective Information at Decision-Making Process: Health Information System: E-Health Applications include the web-based presentation of health services as a whole in an electronic environment, the processes of storing data, carrying out diagnosis and treatments, and evaluating the results. E-health applications in Türkiye, whose technological infrastructure has become stronger, are now more advanced than many countries worldwide.

When compared to other countries, Türkiye's health expenditure as a percentage of gross domestic product (GDP) is quite low at 4.9%, as opposed to the OECD average current health expenditure of 9.6% in 2021.⁷ In Türkiye, the proportion of out-of-pocket health expenditure within the total health expenditure has shown a decrease over the years. It was 25% in 2002, but by 2021, it had decreased to 15.9% of the total health expenditure.⁹ Although the rate of catastrophic health expenditure (defined as health expenditures exceeding 40% of a household's income after basic needs are met) in households decreased from 0.81% in 2002 to 0.14% in 2012, it increased again to 0.43% in 2019. The incidence of impoverishment due to HEX (the situation where a non-poor household becomes impoverished after spending on healthcare services) decreased from 0.43% in 2002 to 0.06% in 2019.⁹ It has been observed that as individuals' out-of-pocket health expenditure decreased, the rate of catastrophic health expenditures also decreased. Consequently, satisfaction with healthcare services increased. This indicates that in Türkiye, the public financing model resulting from inclusive healthcare policies has a low capacity for generating poverty.¹⁰

In the research conducted on the population who are satisfied with the availability of quality health services in the region in which they live, the rate of satisfaction with health services on average in OECD countries is 71%. Türkiye's satisfaction rate with health services, which was 39.5% in 2003, is now close to the OECD average. Among OECD countries, Türkiye has the highest level of satisfaction with health services in terms of the resources spent on health services.

In recent years, Türkiye has faced several new significant challenges: First, demand patterns have shifted due to increased expectations and usage. Second, there has been a shift in behavior due to greater competition and a perceived fall in the standing of healthcare staff. Third, there is an increasing need to promote healthy lifestyles in chronic illness patients, as obesity and inactivity are prevalent and are anticipated to be the most severe health issues to be addressed in the near future.¹

Literature Review

In many studies, results similar to this study showed a relationship between infant mortality and the number of physicians and health expenditure.

In many studies, results similar to this study showed a relationship between infant mortality and the number of physicians and health expenditure. Owusu 2021 found that increased health expenditure is associated with decreased infant mortality rates across different income countries.¹¹ Russo 2019 found that an increase of one primary care physician per 10,000 population in Brazil was associated with 7.08 fewer infant deaths per 10,000 live births.¹² Dhrifi 2018 found that health expenditure positively reduces child mortality rates in upper-middle-income and high-income countries.¹³ Shi 2004 found that primary care physician supply was negatively associated with infant mortality in the US states.¹⁴

Subramaniam (2018) found that education, female education, income, and access to healthcare were significant determinants of IM in Malaysia, Thailand, Indonesia, and the Philippines.¹⁵ Barenberg 2017 finds that increased public health expenditure in Indian states is associated with a reduced infant mortality rate.¹⁶ Rhee 2012 suggests that the health system itself affects the infant mortality rate in the long run, while life expectancy at birth is immediately affected by health-related facilities.¹⁷ However, Akinlo 2019 finds that government health expenditure positively affects under-five and infant mortality rates in sub-Saharan African countries, possibly due to corruption and fungibility issues.¹⁸ David (2018) examined the relationship between IM and public health expenditure in Nigeria from 1980 to 2016 using the ARDL method. He concluded that this indicates the presence of a significant cointegrating (long-run) relationship between IM and government health expenditure.¹⁹

Ifa and Guetat, in their research, examined the short- and long-term relationship between neonatal mortality rate, economic growth, energy consumption, female literacy, and air pollution in India in 1970-2021, using the ARDL approach and VECM method.²⁰

Overall, these papers suggest that increasing the number of physicians and health expenditures can help decrease infant mortality rates. This study investigated the impact of HEX, PHY, and HTP on IM.

Materials and Methods

In this study, the ARDL bounds testing approach was employed. The data covering Türkiye's years from 1975 to 2018 were obtained from the OECD Health Statistics Database for HEX and PHY and the World Bank database for IM. In this study, the ARDL bounds testing approach was employed. The data covering Türkiye's years from 1975 to 2018 were obtained from the OECD Health Statistics Database for HEX and PHY and from the World Bank database for IM.^{5,7}

In the study, the natural logarithms (LOG) of variables other than the HTP were taken to obtain the logarithms of infant mortality rate (LOGIM), logarithms of healthcare expenditure (LOGHEX), and logarithms of physicians per 1,000 People (LOGPHY) variables.

The ARDL bounds testing is a time-series analysis used to determine independent variables' short-term and long-term effects on the dependent variable.

In this boundary test developed by Pesaran, Shin, and Smith (2001), after checking the stationarity of variables, the analysis proceeds to ARDL. It is a prerequisite in the ARDL bounds testing approach that a variable used must either be stationary at levels (I(0)) or become stationary at the first difference (I(1)). Therefore, in this study, the Augmented Dickey-Fuller (ADF) unit root test was used to test the stationarity of variables.²¹

As observed, in the ARDL bounds test, stationary variables at different orders can be used in the same analysis, which is a significant advantage of the ARDL bounds testing approach.²²

In addition, another significant advantage of the ARDL bounds testing approach is that it allows for analyses with fewer observations than required by other time-series analyses.²³

In the ARDL bounds testing approach, a boundary test based on the F-statistic is conducted to determine whether a long-term relationship exists among variables. The null hypothesis (H₀) of this test is formulated as there is no long-term relationship among the variables, and in cases where H₀ is rejected, the alternative hypothesis (H₁) is accepted. As observed, when H₁ is accepted, it implies a long-term relationship, i.e., co-integration, among the variables.

Once a long-term relationship is established in ARDL, short-term results are obtained using the Error Correction Model (ECM). In ECM, the lagged version of error correction terms (ECT (-1)) is included in the analysis.

For the Error Correction Model (ECM) to be considered statistically significant and valid, the coefficient of ECT (-1) should be statistically significant and negative, and its absolute value should typically fall within the range of 0 to 1. This condition indicates that the error correction term is effectively contributing to the adjustment process in the short term.²⁰

In this study, after obtaining the results of the ARDL bounds test, the model's potential issues with autocorrelation (serial correlation) and heteroscedasticity were examined using the Breusch-Godfrey Serial Correlation LM and Breusch-Pagan-Godfrey tests. Additionally, the study investigated whether there was a model specification error using the Ramsey Reset test and assessed the normal distribution fit of the model using the Jarque-Bera test. When the null hypotheses of these tests were accepted, it was concluded that there were no issues with autocorrelation, changing variances, or model specification errors, and the model exhibited a normal distribution. Furthermore, the stability of the model was tested using CUSUM and CUSUM of Square tests.

Prior to the ARDL bounds test, the optimal lag length required for this test was determined using the Vector Autoregressive (VAR) model. Accordingly, the lag length that was most preferred among the Akaike information criterion (AIC), Schwarz information criterion (SC), and Hannan-Quinn information criterion (HQ) in the VAR model was selected as the lag length for the ARDL bounds test.

All analyses in this study were conducted at a 95% confidence level, and the Eviews 10 software package was used.

Results

Firstly, descriptive statistics for the study variables were obtained within the scope of the study. According to the results, IM takes values from 9.20 to 108.70, with a mean of 45.97 ± 30.48 . HEX has values of 37.80 to 1,223.56, with an average of 424.92 ± 376.22 . Finally, PHY takes values within the range of 0.54 to 1.88, with a mean of 1.16 ± 0.44 (Table 1).

Table 1. Descriptive Statistics

	IM	HEX	PHY
Mean	45.97	424.92	1.16
Maximum	108.70	1,223.56	1.88
Minimum	9.20	37.80	0.54
Standard Deviation	30.48	376.22	0.44
Observations	44	44	44

ADF Unit Root test results are presented in Table 2. According to the results, the LOGIM, LOGHEX, and LOGPHY variables used in the study are non-stationary at levels but become stationary at first differences. Based on these findings, it can be concluded that the variables used in the study are suitable for the ARDL bounds test.

Table 2. ADF Unit Root Test Results

Variables	<i>t</i> statistic, At Level (I(0))			<i>t</i> statistic, At First Difference (I(1))		
	Intercept	Trend and Intercept	None	Intercept	Trend and Intercept	None
LOGIM	0.333	-2.907	-1.711	-2.991*	-3.601*	-2.001*
LOGHEX	-0.974	-2.351	4.167	-8.251**	-8.417**	-0.282
LOGPHY	-1.461	-0.333	-0.378	-4.096*	-3.767*	-2.279*

* and ** indicate the acceptance of the alternative hypothesis at 95% and 99% confidence levels, respectively.

According to the results of the VAR model, among the evaluation criteria, the Final Prediction Error (FPE), Akaike Information Criterion (AIC), Schwarz Information Criterion (SC), and Hannan-Quinn Information Criterion (HQ), the lag length of 1 is the most preferred. Therefore, a maximum lag length of 1 was chosen for the ARDL bounds test.

Based on the F-statistic results of the ARDL bounds testing approach, the F-test value (2376.34) is greater than the critical values of I0 (2.79) and I1 (3.67) at the 5% significance level. This indicates a long-term relationship among the variables in the study. The ARDL bounds test results are presented in Table 3. As seen in Table 3, the study's independent variables explain 99% of the variation in the dependent variable ($R^2=0.99$). The model established in the study is significant ($F=464226.5$). The model in the study does not experience model specification errors, multicollinearity issues, and heteroskedasticity issues, as indicated by the results of the Ramsey Reset ($p=0.801$), Breusch-Godfrey Serial Correlation LM ($p=0.187$), and Breusch-Pagan-Godfrey tests ($p=0.406$). Furthermore, it is understood from the Jarque-Bera test results ($p=0.139$) that the model in the study follows a normal distribution.

The short-term and long-term results of the ARDL bounds test are presented in Table 4. According to the results, the independent variables HEX, PHY, and HTP in the short term reduce IM. The short-term results of the independent variables HEX ($p=0.157$), PHY ($p=0.390$), and HTP ($p=0.420$) on IM were not found to be statistically significant.

Table 3. ARDL Bounds Testing Results

Dependent Variable: LOGIM				
Model selection method: Akaike info criterion (AIC)				
Selected Model: ARDL (1, 0, 0, 0)				
Variable	Coefficient	Standard Error	t-Statistic	p-value
LOGIM (-1)	0.977	0.005	207.543	0.001**
LOGHEX	-0.012	0.004	-2.739	0.009
LOGPHY	-0.032	0.010	-3.068	0.004*
HTP	-0.005	0.002	-2.288	0.028*
C	0.097	0.034	2.889	0.006*
R-squared (R ²)	0.999	Durbin-Watson stat		1.657
Adjusted R ²	0.999	Ramsey Reset Test p-value		0.801
Standard Error of regression	0.003	Breusch-Godfrey Serial Correlation LM Test		0.187
Log-likelihood	184.194	Jarque-Berra Test p value		0.139
F-statistic	464226.5	Breusch-Pagan-Godfrey Test p value		0.406
Prob (F-statistic)	0.000			

* and ** indicate the acceptance of the alternative hypothesis at 95% and 99% confidence levels, respectively.

According to the results, the independent variables HEX, PHY, and HTP in the long term reduce IM. The long-term results of the independent variables HEX (p=0.007), PHY (p=0.004), and HTP (p=0.012) on IM are statistically significant.

In the ECM, the lagged version of the error terms ranges from -1 to 0 and is statistically significant (p=0.001). The coefficient of ECM(-1) being approximately -0.02 suggests that deviations from the long-term level of IM decrease by approximately 2% each year (p=0.001).

Table 4. ECM and Long Run Results

Dependent Variable: LOGIM				
Selected Model: ARDL (1, 0, 0, 0)				
Short Run Coefficients				
Variable	Coefficient	Standard Error	t-Statistic	p-value
D (LOGHEX)	-0.007	0.005	-1.446	0.157
D (LOGPHY)	-0.021	0.024	-0.870	0.390
D (HTP)	-0.003	0.004	-0.816	0.420
ECM (-1)	-0.024	0.000	-61.655	0.001**
Long Run Coefficients				
Variable	Coefficient	Standard Error	t-Statistic	p-value
LOGHEX	-0.506	0.178	-2.838	0.007*
LOGPHY	-1.377	0.442	-3.117	0.004*
HTP	-0.240	0.091	-2.630	0.012*
C	4.185	0.960	4.358	0.001**

* and ** indicate the acceptance of the alternative hypothesis at 95% and 99% confidence levels, respectively.

CUSUM and CUSUM of Squares tests were used to test the stability of the study's model (Figure 1). When examining the results of these tests, although there is some deviation according to the CUSUM test, the model of the study is considered stable according to the CUSUM of Squares Test.

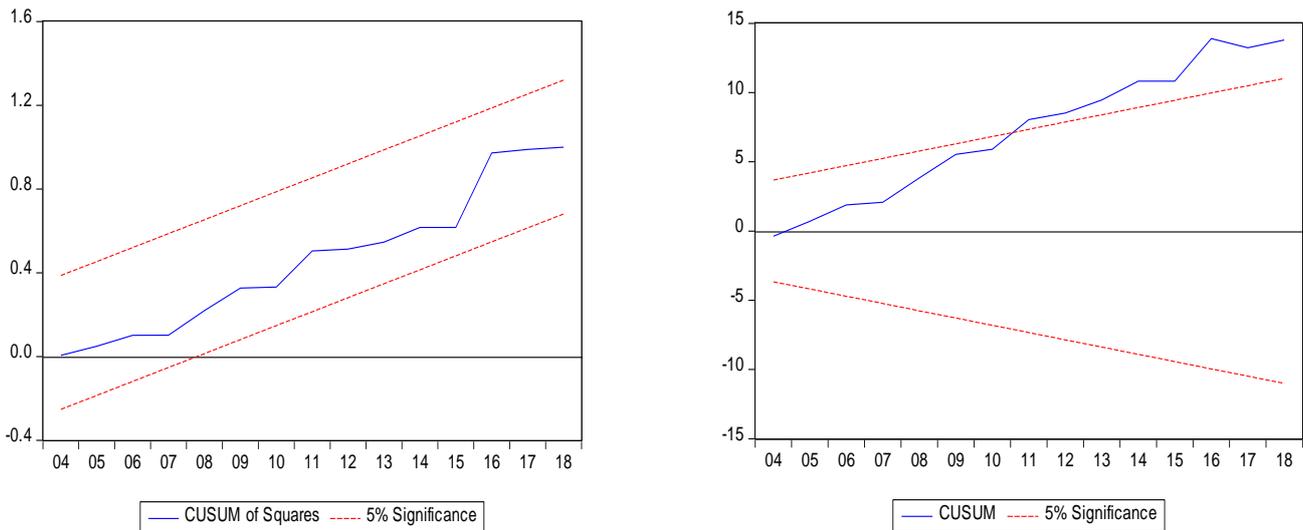


Figure 2. CUSUM and CUSUM of Squares Results

Discussion

In 2003, a system-wide, comprehensive health reform in Türkiye, the HTP, was brought to the agenda.

This rapid decrease in infant deaths and strengthening of the health care system during the HTP implementation process can be explained by outcomes such as increased access to health services as a result of the reform's expansion of newborn care specialists and facilities, health personnel providing more widespread birth services, and family physicians working in primary health services covering the entire country.

Health expenditure is critical to health systems' ability to maintain and increase human welfare; without funding, trained and competent health professionals would not be employed, medical equipment would not be available, and health promotion or illness prevention would not occur. Health spending shows the population's entire consumption of health goods and services across countries. Investing in the healthcare system results in healthier lives, produces jobs, improves political and social stability, and helps economic growth and productivity.

Increasing health expenditure is used to increase the quality and accessibility of health services by providing and developing health facilities and improving the efficiency of the health system, Additionally, expenditures on essential health services such as vaccination, infectious diseases, and preventive health services affect the reduction of diseases and infant mortality rates.

According to the short and long-term results of the ARDL limit test, it was observed that the independent variables HEX, PHY, and HTP reduced IM in the short term. However, it was found that the short-term results of the independent variables HEX ($p=0.157$), PHY ($p=0.390$), and HTP ($p=0.420$) on IM were not statistically significant.

According to the ARDL bounds test, the independent variables HEX, PHY, and HTP in the long term reduce IM. The long-term results of the independent variables HEX ($p=0.007$), PHY ($p=0.004$), and HTP ($p=0.012$) on IM are statistically significant.

According to this study, there is a strong correlation between per capita health spending and infant mortality. As health spending per capita increased, baby mortality decreased in the long run. Both HEX and PHY reduced the infant mortality rate in the long term. These results are consistent with Anwar et al.²⁴, Ullah et al.²⁵, Rahman et al.²⁶, Lu et al.²⁷, and many others.

This study, which reveals to what extent and in what direction changes in health expenditures and the number of doctors in countries will affect infant mortality, showed similarities with previous studies. Rana et al.(2018),²⁸ and Kara 2020 also support the relationship between health expenditure and infant mortality rates, finding a long-term relationship and causality between health expenditure and infant mortality rates.²⁹

According to the study by O'Hara et al., if GDP increases by 10%, the infant mortality rate is expected to decrease by 10%.³⁰ These results are consistent with the expectation that government expenditure on health is likely to increase and improve medical facilities and make these accessible to all, reducing child and infant mortalities.

It is suggested that the HTP application process is progressing positively for patients and should be actively continued by turning into continuous improvement. It is recommended to monitor these identified effects and develop health policies accordingly.

Although the HTP effectively solved many health problems when envisaged twenty years ago, today, paving the way for big-data studies with health data will contribute to the development of the health field.

Considering that the most important problem in the Turkish healthcare system is qualified healthcare personnel, the number of healthcare professionals should be increased.

Developing health information systems, especially remote ones, will further increase society's/individuals' access to health services and timely and effective prenatal and postnatal care and baby-child follow-ups.

It is suggested that private health expenditures should also be considered in new studies, where there is a decrease in private health expenditures and an increase in total health expenditures per capita.

Public health expenditure could investigate the effects of incidences of environmental degradation on health status, particularly infant mortality. In addition to new research, decision-makers should review their health expenditures to curb CO2 emissions effectively, promoting a healthy environment.

Ethical Considerations: This study is within the scope of studies that do not require ethics committee approval according to the TR Index ethical principles flowchart. Publicly available data were used in the study.

Conflict of Interest: The authors declare no conflict of interest.

References

1. Akdağ R. Lessons from health transformation in Türkiye: leadership and challenges. *Health Systems & Reform*. 2015;1(1):3-8.
2. Ministry of Health. Health Transformation Program 2003, Ankara.
3. Sparkes SP, Bump JB, Reich MR. Political strategies for health reform in Türkiye: extending veto point theory. *Health Systems & Reform*. 2015;1(4):263-75.
4. Hone T, Gurol-Urganci I, Millett C, Başara B, Akdağ R, Atun R. Effect of primary health care reforms in Türkiye on health service utilization and user satisfaction. *Health policy and planning*. 2017;32(1):57-67.
5. World Bank. Mortality rate, infant (per 1,000 live births) in Türkiye. <https://data.worldbank.org/indicator/SP.DYN.IMRT.IN?locations=TR.2021>. (Accessed: 23.09.2023).
6. Cumhurbaşkanlığı 2022 Yıllık Programının Onaylanması Hakkında Karar 4633. <https://www.resmigazete.gov.tr/eskiler/2022/10/20221025M1-1.pdf>. (Accessed: 23.09.2023).
7. OECD. OECD Health Data 2023. <https://data.oecd.org/searchresults/?q=health2023>. (Accessed: 23.09.2023).
8. Nguyen TA, Knight R, Roughead EE, Brooks G, Mant A. Policy options for pharmaceutical pricing and purchasing: issues for low-and middle-income countries. *Health Policy and Planning*. 2015;30(2):267-80.
9. Ministry of Health. Sağlık Bakanlığı. Sağlık İstatistikleri Yıllığı 2021. <https://dosyasb.saglik.gov.tr/Eklenti/45317,siy2021-ingilizcepdf.pdf?02022>. (Accessed: 23.09.2023).
10. Atasever M, Karaca Z, Sanisoğlu SY, Alkan A, BAĞCI H. Türkiye’de katastrofik sağlık harcamaları ve sağlık hizmetlerinden memnuniyet oranı ile ilişkisi. *Ankara Medical Journal*. 2018;18(1):22-30.
11. Owusu PA, Sarkodie SA, Pedersen PA. Relationship between mortality and health care expenditure: Sustainable assessment of health care system. *Plos one*. 2021;16(2):e0247413.
12. Russo LX, Scott A, Sivey P, Dias J. Primary care physicians and infant mortality: evidence from Brazil. *PLoS One*. 2019;14(5):e0217614.
13. Dhrifi A. Healthcare expenditures, economic growth and infant mortality: evidence from developed and developing countries. *CEPAL Rev No 125, August 2018*. 2019;69.
14. Shi L, Macinko J, Starfield B, et al. Primary care, infant mortality, and low birth weight in the states of the USA. *Journal of Epidemiology & Community Health*. 2004;58(5):374-80.
15. Subramaniam T, Loganathan N, Yerushalmi E, Devadason ES, Majid M. Determinants of infant mortality in older ASEAN economies. *Social Indicators Research*. 2018;136:397-415.
16. Barenberg AJ, Basu D, Soylu C. The effect of public health expenditure on infant mortality: evidence from a panel of Indian states, 1983–1984 to 2011–2012. *The Journal of Development Studies*. 2017;53(10):1765-84.

17. Rhee H-J. Effects of health care expenditure on the infant mortality rate and life expectancy at birth in Korea. *International Journal of Contents*. 2012;8(3):52-6.
18. Akinlo AE, Sulola AO. Health care expenditure and infant mortality in sub-Saharan Africa. *Journal of Policy Modeling*. 2019;41(1):168-78.
19. David J. Infant mortality and public health expenditure in Nigeria: Empirical explanation of the nexus. *Timisoara Journal of Economics and Business (TJE&B)*. 2018;11(2):149-64.
20. Ifa A, Guetat I. Save Infant's Live or Save Economic Growth? An Analysis by ARDL Approach: Case of India. *Energy Exploration & Exploitation*. 2023;41(2):766-84.
21. Pesaran MH, Shin Y, Smith RJ. Bounds testing approaches to the analysis of level relationships. *Journal of applied econometrics*. 2001;16(3):289-326.
22. Khandelwal V. Impact of energy consumption, GDP & Fiscal deficit on public health expenditure in India: An ARDL bounds testing approach. *Energy Procedia*. 2015;75:2658-64.
23. Tang TC. Japanese aggregate import demand function: reassessment from the 'bounds' testing approach. *Japan and the World Economy*. 2003;15(4):419-36.
24. Anwar A, Hyder S, Mohamed Nor N, Younis M. Government health expenditures and health outcome nexus: a study on OECD countries. *Frontiers in Public Health*. 2023;11:1123759.
25. Ullah I, Ullah A, Ali S, et al. Public health expenditures and health outcomes in Pakistan: evidence from quantile autoregressive distributed lag model. *Risk Management and Healthcare Policy*. 2021:3893-909.
26. Rahman MM, Khanam R, Rahman M. Health care expenditure and health outcome nexus: new evidence from the SAARC-ASEAN region. *Globalization and health*. 2018;14(1):1-11.
27. Lu Z, Bandara JS, Paramati SR. Impact of sanitation, safe drinking water and health expenditure on infant mortality rate in developing economies. *Australian Economic Papers*. 2020;59(1):13-33.
28. Rana RH, Alam K, Gow J. Health expenditure, child and maternal mortality nexus: a comparative global analysis. *BMC international health and human rights*. 2018;18:1-15.
29. Kara F, Ersin İ. The effects of health expenditures to decrease infant mortality rates in OECD countries. *Multidimensional perspectives and global analysis of universal health coverage: IGI Global*; 2020:357-83.
30. O'Hare B, Makuta I, Chiwaula L, Bar-Zeev N. Income and child mortality in developing countries: a systematic review and meta-analysis. *Journal of the Royal Society of Medicine*. 2013;106(10):408-14.