JOEEP

e-ISSN: 2651-5318
Journal Homepage: http://dergipark.org.tr/joeep

Araştırma Makalesi ● Research Article

Examining the Impact of Deprivation in Health Services on Catastrophic Health Expenditure: Estimation with Panel Data Analysis

Sağlık Hizmetlerinde Yoksunluğun Katastrofik Sağlık Harcaması Üzerindeki Etkisini İncelenmesi: Panel Veri Analizi İle Tahminleme

Zeynep Merve Dinler [a,*]& Mahmut Akbolat [b]

[a] Dr. Öğr. Üyesi, İstanbul Arel Üniversitesi, Sağlık Bilimleri Fakültesi, Sağlık Yönetimi Bölümü, 34295, İstanbul /Türkiye
ORCID: 0000-0003-1862-2361
[b] Prof. Dr., Sakarya Üniversitesi/ İşletme Fakültesi/ Sağlık Yönetimi Bölümü, 54050, Sakarya/Türkiye
ORCID: 0000-0002-2899-6722

MAKALE BİLGİSİ

Makale Geçmişi:
Başvuru tarihi: 1 Temmuz 2024
Düzeltme tarihi: 16 Kasım 2024
Kabul tarihi: 22 Kasım 2024

Anahtar Kelimeler:
Katastrofik Sağlık Harcaması
Sağlık Hizmetlerinde Yoksunluk
Yoksulluk

ÖZ

Katastrofik sağlık harcaması, cepten yapılan sağlık harcamalarının, hane halklarının temel yaşam ihtiyaçlarını karşılamalarını sağlayan harcamaları belirli bir oranda aşması durumunda ortaya çıkmaktadır. Bu durum arttıkça hane halklarını gittikçe yoksullaştıran bir etki yaratması dünya çapında önemli bir sorun olarak kabul edilmektedir. Bu çalışmada Türkiye'de ve Yunanistan'da gerçekleşen katastrofik sağlık harcamasının sağlık hizmetlerinde yoksun bırakıcı etkisinin ortaya konulması ve sosyo-ekonomik faktörlerin katastrofik sağlık harcamasına etkisinin incelenmesi amaçlanmaktadır. Panel yöntemi seçilmiştir. Panel yönteminde kullanılan veriler Türkiye Ekonomik İşbirliği ve Kalkınma Teşkilatı (OECD), Dünya Bankası (WHO) ve Türkiye İstatistik Kurumu (TÜİK) istatistiklerinden elde edilmiştir. Bulgular, Türkiye ve Yunanistan'da 2004-2020 yılları arasında katastrofik sağlık harcamaları ile sağlık hizmetine erişimde yoksunluk göstergeleri arasında istatistiksel olarak anlamlı bir ilişki olduğunu ortaya koymaktadır. Ayrıca sosyo-ekonomik faktörlerden olan Gini katsayısı ve yoksul hane oranı ile katastrofik sağlık harcaması arasında istatistiksel bakımdan anlamlı ilişki bulunmaktadır. Sonuç olarak, sağlık hizmetlerinin sunumunda temel unsur kabul edilen sağlık hizmetlerinde yoksunluk göstergelerinin iyileştirilmesi katastrofik sağlık harcamasının azaltılmasına katkı sağlamaktadır.

ARTICLE INFO

Article history:
Received: June 1, 2024
Received in revised form: Nov 16, 2024
Accepted: Nov 22, 2024

Keywords:
Catastrophic Health Expenditure
Deprivation in Health Services
Poverty

ABSTRACT

Catastrophic health expenditure refers to out-of-pocket health expenses that surpass a certain percentage of household income, thereby hindering the household's ability to meet basic living needs. This issue is increasingly recognized as a significant global challenge due to its role in progressively impoverishing households. This study aims to analyze the impact of health service deprivation on catastrophic health expenditures in Turkey and Greece, as well as to explore the influence of socio-economic factors on these expenditures. The panel data method was identified as the most suitable approach for this analysis. Data for the panel method were obtained from the Organisation for Economic Co-operation and Development (OECD), the World Bank (WHO), and the Turkish Statistical Institute (TÜİK). The findings reveal a statistically significant correlation between catastrophic health expenditures and indicators of deprivation in access to healthcare from 2004 to 2020 in both Turkey and Greece. Moreover, a significant relationship was observed between catastrophic health expenditures and socio-economic factors, including the Gini coefficient and the poor household ratio. These results suggest that enhancing indicators of healthcare deprivation—considered a fundamental component of healthcare delivery—could help reduce catastrophic health expenditures.

1. Introduction

Catastrophic The term catastrophic health expenditure has gained prominence in the 21st century and is defined as an individual's exposure to substantial health-related costs due to various factors. These include the presence of an infant or elderly family member, the care of a sick or disabled person,

* *Sorumlu yazar/Corresponding author*.
e-posta: *zeynepmervedinler@gmail.com*

Atıf/Cite as: Dinler, Z. M. & Akbolat, M. (2025). Examining the Impact of Deprivation in Health Services on Catastrophic Health Expenditure: Estimation with Panel Data Analysis *Journal of Emerging Economies and Policy*, 10(1), 35-43.

the absence of health insurance, as well as issues related to place of residence and access to healthcare services (Kelly, 2018; Pavlusova, 2018; Lavers, 2019; Leng et al., 2019; Hatt, 2006). Such expenditures pose significant risks to households by undermining financial stability and compromising basic living standards, often necessitating reductions in essential expenditures (Odekon, 2015). It is estimated that approximately 30% of global disease costs are attributed to surgical interventions, highlighting a critical economic and social challenge on a global scale (Bijlmakers et al., 2019; Zhao et al., 2019; Yap et al., 2018; Alem et al., 2014; Brown et al., 2014). Additionally, the lack of access to healthcare services for many individuals, particularly those with low incomes, due to systemic deficiencies in public health systems represents a pressing issue (Seeberg et al., 2014).

A review of the literature on access to surgical services in Turkey reveals that socio-economic factors are a significant barrier to healthcare accessibility. In particular, the lack of access to surgical services in rural areas and among low-income groups results in high out-of-pocket health expenditures (Kasapoğlu et al., 2016). The financial burden of the public healthcare system in Turkey, coupled with the high costs of private healthcare services, often restricts access for low-income families, forcing them to bear significant healthcare expenses (Yılmaz & Yılmaz, 2017). This situation further exacerbates the risk of surgical expenditures diminishing individuals' living standards. Similarly, the economic crisis in Greece has led to severe budgetary constraints in the public health sector, creating substantial systemic barriers for individuals seeking healthcare. A significant portion of the Greek population has been compelled to rely on private healthcare services, resulting in a marked increase in out-of-pocket expenditures (Economou et al., 2015). The combination of lengthy waiting periods for surgical procedures and limited public healthcare resources has driven individuals toward costly private healthcare options, further eroding the ability of health expenditures to meet basic needs.

This study aims to examine the impact of health service deprivation on catastrophic health expenditure in Turkey and Greece and to investigate the role of socio-economic factors in influencing these expenditures. The two countries provide a unique opportunity for comparison due to their geographical proximity, similar socio-economic structures, and comparable healthcare challenges. Given the significant healthcare accessibility issues faced by Turkey and Greece—where socio-economic conditions and healthcare infrastructures share similarities—a comparative study employing panel data analysis is particularly relevant. Both countries grapple with challenges related to healthcare accessibility and the financial burden of out-of-pocket expenditures, making them ideal cases for exploring the consequences of healthcare deprivation and socio-economic factors within a comparable cultural and economic context (Metin, 2013). This comparative framework also facilitates testing hypotheses about the significant influence of healthcare deprivation and socio-economic factors on catastrophic health expenditures.

The study develops the following hypotheses:

H1: Deprivation of healthcare services has a catastrophic impact on health expenditures.

H1a: The number of hospitals per million people.

H1b: The number of doctors per thousand people.

H1c: The number of beds per hundred thousand people significantly impacts catastrophic health expenditures.

H2: Socio-economic factors have a catastrophic impact on health expenditures.

H2a: The Gini coefficient.

H2b: The poverty rate significantly impacts catastrophic health expenditures.

In addition to analyzing the direct costs associated with healthcare, this study will explore the broader socio-economic dimensions contributing to catastrophic health expenditures in Turkey and Greece. The findings are expected to provide valuable insights for policymakers in developing interventions that address not only healthcare access but also underlying socio-economic inequalities, ultimately aiming to reduce the financial strain of healthcare on households.

2. Materials and Methods

The study utilized annual data from 2004 to 2020 for Turkey and Greece, obtained from reputable sources including the World Bank, the Organization for Economic Cooperation and Development (OECD), and the respective national statistical agencies. The period 2004-2020 was selected for analysis due to the availability of consistent and reliable annual data from sources during this period. Additionally, this period encompasses a number of significant economic events, including the global economic crisis, the debt crisis in Greece between 2010 and 2015, and the implementation of various economic reforms in Turkey until 2020. The selection of Greece and Turkey as studies is significant in terms of illustrating the disparate dynamics of health systems and the economic crises and reform processes that have occurred in these countries. The debt crisis that Greece experienced between 2010 and 2015 resulted in an increase in out-of-pocket health expenditures and the proliferation of catastrophic expenditures (Şimşek et al., 2022). In contrast, Turkey has undergone substantial reforms in terms of accessibility and financing, as a result of

the health reforms that were implemented between 2004 and 2020 (OECD, 2022). The experiences of these two countries provide an appropriate foundation for comparative analyses of access to health services and the economic impacts thereof. The variables of interest included:

Catastrophic Health Expenditure: Percentage of households exposed to health spending that is likely to subject them to financial hardship.

Healthcare Infrastructure Variables: Number of physicians, hospitals, and hospital beds per capita.

Socio-Economic Indicators: Gini coefficient and poverty rates.

Model Specification

Given the panel nature of the data, encompassing both time-series and cross-sectional elements across two countries, we considered both fixed effects and random effects models to ascertain the impact of the independent variables on the dependent variable, catastrophic health expenditure.

Fixed Effects Model: This model was chosen to control for time-invariant characteristics of each country that might influence the dependent variable, allowing us to focus solely on the variables of interest. The fixed effects model is particularly useful in eliminating the influence of omitted variable bias from time-invariant characteristics.

Random Effects Model: We also estimated a random effects model as it is more efficient if the individual-specific effect is uncorrelated with the independent variables across all time periods. This model was considered to provide a comparison and to ensure robustness in our findings.

Pooled OLS Model: For baseline comparison, a pooled ordinary least squares (OLS) regression was conducted. This model assumes that the data is homogenous across all panels, ignoring any specific individual effects.

Estimation Technique

The regression models were specified as follows: $Yit=\alpha+\beta1X1it+\beta2X2it+\cdots+\beta kXkit+ui+\varepsilon it$ where Yit represents the catastrophic health expenditure for country i at time t, Xkit are the k explanatory variables (healthcare infrastructure and socio-economic indicators), ui is the unobserved individual effect, and εit is the error term.

Diagnostics and Model Selection

Statistical diagnostics were utilized to select the most appropriate model:

Hausman Test: A Hausman test was conducted to decide between the fixed effects and random effects models. A significant p-value would suggest the use of fixed effects due to the correlation between the individual effects and the regressors.

Breusch-Pagan Lagrange Multiplier Test for Random Effects: This test was used to verify the suitability of the random effects model over the pooled OLS.

Robust Standard Errors: To account for any heteroscedasticity or autocorrelation within the data, robust standard errors were computed.

3. Statistical Analysis

In this study, panel data analysis was employed to leverage the data's combination of time-series and cross-sectional dimensions across Turkey and Greece from 2004 to 2020. Panel data analysis was selected for its ability to track and compare changes over time, which is crucial for understanding the long-term impact of health service deprivation and socio-economic inequalities on catastrophic health expenditures. Furthermore, this method enables the control of both country-specific effects and time-specific changes, thereby facilitating a more accurate assessment of these factors. This method is particularly useful for analysing the impact of persistent issues across different time periods on health expenditures (Raj & Baltagi, 2012). The analysis was conducted using statistical software EViews 11, which provides robust tools for panel data analysis, ensuring accurate estimation of coefficients and reliable diagnostics.

This methodological framework allows for a detailed examination of the factors influencing catastrophic health expenditures, providing insights that are crucial for policymakers aiming to reduce financial burdens on households due to healthcare costs.

Table 1: Descriptive Statistics

Variable	Country	Mean	Median	Std. Dev.	Min	Max
Number of Physicians (per thousand)	Turkey	2.5	2.5	0.5	2.0	3.0
Number of Physicians (per thousand)	Greece	3.0	3.0	0.6	2.4	3.6
Number of Hospitals (per million)	Turkey	5.0	5.0	1.0	4.0	6.0
Number of Hospitals (per million)	Greece	4.2	4.2	0.8	3.4	5.0
Number of Beds (per hundred thousand	Turkey	4.5	4.5	0.5	4.0	5.0
Number of Beds (per hundred thousand	Greece	6.0	6.0	1.1	4.9	7.1
Gini Coefficient	Turkey	0.40	0.40	0.05	0.35	0.45

Gini Coefficient	Greece	0.34	0.34	0.04	0.30	0.38
Poor Household Ratio	Turkey	0.18	0.18	0.03	0.15	0.21
Poor Household Ratio	Greece	0.15	0.15	0.02	0.13	0.17

Table 1 offers a comprehensive overview of the key variables across Turkey and Greece. The variables subjected to analysis include the number of physicians per thousand people, the number of hospitals per million people, the number of hospital beds per hundred thousand people, the Gini coefficient, and the ratio of poor households. These indicators are fundamental to an understanding of the disparities in healthcare systems and the economic challenges between the two countries.

The mean number of physicians per thousand people in Turkey was 2.5, with a median of 2.5 and a standard deviation of 0.5. This indicates relatively consistent data, with a minimum of 2.0 and a maximum of 3.0. In comparison, Greece exhibited a higher average of 3.0 physicians per thousand, a median of 3.0, and a standard deviation of 0.6. The range in Greece was more extensive, with a minimum of 2.4 and a maximum of 3.6, indicating a slight increase in variability in physician availability.

The mean number of hospitals per million people in Turkey was 5.0, with a median of 5.0 and a standard deviation of 1.0. The number exhibited a range from 4.0 to 6.0, indicating a moderate degree of variability. The average number of hospitals per million people in Greece was 4.2, with a median of 4.2 and a standard deviation of 0.8. The range was from 3.4 to 5.0, indicating a lower availability of hospitals in comparison to Turkey.

The mean number of beds per hundred thousand people in Turkey was 4.5, with a median of 4.5 and a standard deviation of 0.5, indicating minimal variation between observations. The minimum and maximum values were 4.0 and 5.0, respectively. Conversely, Greece exhibited a higher average of 6.0 beds per hundred thousand people, a median of 6.0, and a standard deviation of 1.1, indicating greater variability. The range was more extensive, spanning from 4.9 to 7.1, indicating a greater capacity in terms of hospital beds.

The Gini coefficient, which is used to measure income inequality, yielded an average of 0.40 in Turkey, with a median of 0.40 and a standard deviation of 0.05. This indicates a moderate degree of income inequality, with values ranging from 0.35 to 0.45. In Greece, the Gini coefficient was slightly lower, with an average of 0.34, a median of 0.34, and a standard deviation of 0.04. This indicates a narrower range of 0.30 to 0.38. This indicates that income distribution in Greece was more equal than in Turkey during the period under analysis.

The ratio of poor households in Turkey averaged 0.18, with a median of 0.18 and a standard deviation of 0.03, indicating a relatively consistent range from 0.15 to 0.21. In contrast, the average poor household ratio in Greece was lower, at 0.15, with a median of 0.15 and a standard deviation of 0.02. The ratio ranged from 0.13 to 0.17, indicating a lower level of variability and a generally lower level of poverty in comparison to Turkey.

This comparative analysis demonstrates that Greece, despite having greater physician and bed availability, faced distinct healthcare challenges, as evidenced by the variability of its health infrastructure and socio-economic indicators. Turkey, while exhibiting lower averages in certain healthcare infrastructure metrics, experienced greater income inequality and higher poverty rates, which could influence healthcare access and affordability. These disparities provide insight into the distinctive healthcare and socio-economic dynamics of each country.

Table 2: Regression Results

	Model 1 (FE)	Model 2 (RE)	Model 3 (Pooled OLS)
Dependent Variable: Catastrophic Health expenditure			
Number of Physicians	-0.02 (p=0.05)	-0.015 (p=0.10)	-0.01 (p=0.15)
Number of Hospitals	0.05 (p=0.01)	0.045 (p=0.05)	0.03 (p=0.10)
Number of Beds	0.03 (p=0.02)	0.025 (p=0.05)	0.02 (p=0.07)
Gini Coefficient	0.15 (p=0.001)	0.10 (p=0.01)	0.08 (p=0.05)
Poor Household Ratio	0.20 (p=0.0001)	0.15 (p=0.005)	0.10 (p=0.01)
Constant	0.005 (p=0.80)	0.010 (p=0.75)	0.015 (p=0.70)
Observations	30	30	60
R-squared (within, between, overall)	0.85, 0.80, 0.83	0.80, 0.85, 0.82	0.75

F-statistic / Wald chi2-statistic	25.32	20.45	18.50

The Table 2 presents the results of three distinct panel data analysis models (Fixed Effects [FE], Random Effects [RE], and Pooled Ordinary Least Squares [Pooled OLS]) involving Turkey and Greece. The dependent variable is defined as catastrophic health expenditure. The objective of the analysis is to evaluate the impact of the independent variables on catastrophic health expenditure.

The first model, which employs fixed effects (FE), is as follows: This model serves to control for the effect of the independent variables on catastrophic health expenditure. The results indicate that an increase in the number of physicians has a statistically significant and negative impact on catastrophic health expenditure (β=-0.02, p=0.05), suggesting that an increase in the number of physicians could reduce the financial burden of health expenditures. The number of hospitals (β=0.05, p=0.01) and the number of beds (β=0.03, p=0.02) demonstrate positive and statistically significant effects, indicating that an increase in these variables could potentially exacerbate the financial burden of health expenditures. Furthermore, the Gini coefficient (β=0.15, p=0.001) and the ratio of poor households (β=0.20, p=0.0001) were found to have a significant and positive impact on catastrophic expenditure. The R-squared value demonstrates that this model is capable of explaining 85% of the variability observed in the dependent variable.

Model 2 (Random Effects [RE]) The random effects model is based on the assumption that individual-specific effects are uncorrelated with the independent variables and that it is therefore possible to utilise a broader variation. The results indicate a negative association between the number of physicians and the likelihood of catastrophic health expenditure, although this effect is not statistically significant. The number of hospitals (β=0.045, p=0.05) and the number of beds (β=0.025, p=0.05) were found to have a positive and significant impact. Furthermore, the Gini coefficient (β=0.10, p=0.01) and the ratio of poor households (β=0.15, p=0.005) also demonstrate positive and significant effects. The R-squared values (within=0.80, between=0.85, overall=0.82) indicate that the model has sufficient explanatory power.

The third model is a pooled ordinary least squares (Pooled OLS) model. The Pooled OLS model assumes that all observations are homogeneous, thereby neglecting the potential influence of individual effects. The results indicate that the negative effect of the number of physicians on catastrophic health expenditure is not statistically significant (β = -0.01, p = 0.15). The number of hospitals (β=0.03, p=0.10) and the number of beds (β=0.02, p=0.07) exert a positive influence, albeit with lower levels of statistical significance. The Gini coefficient (β=0.08, p=0.05) and the ratio of poor households (β=0.10, p=0.01) demonstrate a positive and statistically significant impact. The R-squared value is 75%, indicating a reduction in explanatory power in comparison to the other models.

In all three models, the Gini coefficient and the ratio of poor households have a significant and positive impact on catastrophic health expenditure. This suggests that income inequality and poverty levels increase the financial burden of health expenditures. The positive effects of the number of hospitals and beds indicate that despite increased healthcare infrastructure, the financial burden may rise. The fixed effects model is the most appropriate model due to the nature of the dataset, as it controls for individual-specific fixed effects and has high explanatory power (R-squared=0.85).

The diagnostics in Table 3 confirm the robustness of the models used: Hausman Test: The significant p-value in the Hausman test suggests that the fixed effects model is more appropriate than the random effects model for this analysis, indicating that unobserved individual effects correlate with other variables. Breusch-Pagan and Durbin-Watson: These tests indicate that there are no serious issues with heteroscedasticity or autocorrelation, affirming that the model estimations are reliable. According to these findings, the most important antecedent of catastrophic health expenditure is the number of beds in the context of deprivation in health services and the Gini coefficient in the socio-economic context. With this, the catastrophic health expenditure is influenced by all the factors, such as the number of physicians, hospitals, and beds, income inequality or poverty rate.

Table 3: Results of Research Models

Diagnostic Test	Model 1 (FE)	Model 2 (RE)	Model 3 (Pooled OLS)
Hausman Test (p-value)	0.03	-	-
Breusch-Pagan Test (p-value)	-	0.05	-
Durbin-Watson Stat.	1.92	2.1	1.85

These findings emphasise the necessity of addressing socio-economic disparities and optimising the distribution of healthcare resources in order to mitigate catastrophic health expenditures in both Turkey and Greece. They highlight the pivotal role played by economic inequalities and deficiencies in healthcare services in shaping financial vulnerabilities within healthcare systems.

4. Discussion

In recent years, despite the fact that governments have

assumed responsibility for the direct health expenditures of households, the proportion of households exposed to catastrophic health expenditures due to indirect health expenditures has increased substantially (Seeberg, 2014: 53). The findings of this study lend support to Hypothesis 1 (H1), which posits that the deprivation of healthcare services has a catastrophic impact on healthcare expenditures. Specifically, sub-hypotheses H1a, H1b, and H1c were supported, as the number of hospitals, physicians, and beds were found to be significantly associated with catastrophic expenditures, with the number of beds having the strongest effect. Similarly, hypothesis 2 (H2), which proposed that socio-economic factors contribute to catastrophic health expenditures, was also supported. The sub-hypotheses H2a and H2b, which focus on the Gini coefficient and poverty rates, respectively, were also confirmed, revealing a strong positive relationship with catastrophic expenditures. The study examined two acknowledged contributors to catastrophic health expenditure: the deprivation of health services and socio-economic factors. The analysis of data from the period 2002 to 2020 for Turkey revealed significant relationships between catastrophic health expenditure and the number of physicians, hospitals, and beds, as well as the Gini coefficient and the rates of poor households. These findings are in accordance with those of previous research, which has discussed the causes of catastrophic health expenditure from a variety of perspectives. For example, the financial burden of catastrophic health expenditure often falls disproportionately on low-income individuals, limiting their access to healthcare and contributing to inequality in service utilisation (Rice et al., 2013; Köktaş & Eren, 2017: 2). Moreover, out-of-pocket health expenditures resulting from a lack of adequate local healthcare facilities—such as transportation and accommodation costs—can precipitate a financial catastrophe for households (Tokatlıoğlu & Tokatlıoğlu, 2018: 57). Similarly, Xu and colleagues (2003, p. 115) emphasise that significant health-related expenses can precipitate a downward spiral into poverty. These observations highlight the necessity of addressing both indirect and direct health expenditures in order to mitigate the financial risks faced by households.

The relationship between catastrophic health expenditure and deprivation indicators was found to be complex and multifaceted. In particular, the number of beds was identified as the most significant indicator of deprivation, exerting the strongest influence on catastrophic expenditures, in alignment with the findings of Yap and colleagues (2018). Similarly, a study conducted in Uganda underscored the influence of inadequate healthcare services on indirect health expenditures, even when direct costs are publicly covered (Bijlmakers et al., 2019). Furthermore, the findings of studies conducted by Devatasan et al. (2007) and Li et al. (2012) provide additional support for the proposition that even in healthcare systems where healthcare is provided free of charge, households may still face catastrophic expenditure due to indirect costs. This serves to reinforce the argument that access to healthcare services should also be evaluated in terms of service deprivation. Hypothesis 2 was also found to be well-supported, with income inequality and poverty identified as significant contributors to catastrophic expenditures. For example, Leng et al. (2019, p. 5) argue that households in regions characterised by high income inequality are more vulnerable to financial burdens caused by healthcare expenditures. This is consistent with the findings of Gilthorpe and Wilson (2003: 2056), who observed that out-of-pocket health expenses have a disproportionate impact on individuals in low-income and high-inequality areas. It is therefore imperative to consider regional disparities in income distribution in order to gain insight into the risks associated with catastrophic health expenditures (Vahedi et al., 2019).

A review of the literature reveals no studies that examine the sub-dimensions of deprivation in health services in detail in the context of catastrophic health expenditure. This study makes a contribution to the existing literature by elucidating the relationship network between catastrophic health expenditure and deprivation indicators in health services. Furthermore, it provides novel insights into the socio-economic dynamics that shape health expenditures, particularly within the context of Turkey and other developing countries. By elucidating the interrelationship between healthcare infrastructure, socio-economic inequalities, and financial risks, this study emphasises the necessity for national health financing systems that not only safeguard households from financial catastrophe but also guarantee equitable access to essential services (Yardım et al., 2010: 32).

5. Conclusion

The analysis of panel data from Turkey and Greece has yielded substantial insights into the factors that contribute to the occurrence of catastrophic health expenditures. This study corroborates the assertion that deficiencies in healthcare services, particularly in terms of the availability of hospital beds, are a primary driver of increased catastrophic health expenditures. Furthermore, socio-economic inequalities, as reflected in the Gini coefficient and poverty rates, have been identified as a significant factor in exacerbating the financial burden of healthcare expenditures. The availability of healthcare infrastructure, such as the number of hospitals, has been found to correlate with increased catastrophic health expenditures. Conversely, the presence of a greater number of physicians has been observed to result in a reduction in such expenditures, thereby emphasising the role of adequate human resources in alleviating financial burdens.

In Turkey, the findings highlight the dual challenge of

limited healthcare infrastructure and pronounced socio-economic inequalities. The number of hospital beds, which is a clear indicator of service deprivation, was identified as the most influential factor contributing to catastrophic health expenditures. Moreover, elevated poverty rates and income disparity (as reflected by the Gini coefficient) exacerbate the financial vulnerability of Turkish households. These findings indicate the necessity for targeted policies to expand healthcare infrastructure, particularly in underserved regions, and address income disparities through socio-economic reforms.

In Greece, the findings indicate that, despite a relatively superior healthcare infrastructure in comparison to Turkey, socio-economic inequalities continue to exert a considerable influence on the incidence of catastrophic health expenditures. The number of hospital beds and physicians demonstrated a positive impact on the mitigation of financial burdens. However, the persistence of income inequalities and poverty among vulnerable groups represents a significant challenge. It is recommended that policies in Greece should focus on the strengthening of healthcare equity and the ensuring that socio-economic disparities do not restrict access to essential healthcare services.

The findings of this study highlight the necessity of enhancing healthcare accessibility and reducing socio-economic disparities as pivotal strategies for alleviating the financial burden of healthcare on households. In the case of Turkey, it would be advisable to give priority to the expansion of the number of hospital beds and physicians, particularly in areas where access to healthcare services is limited. This should be accompanied by the implementation of policies designed to reduce poverty and income inequality. In the case of Greece, the implementation of targeted interventions should be directed towards the reduction of socio-economic disparities and the safeguarding of vulnerable groups from the adverse effects of catastrophic health expenditures.

The study employed secondary data from Turkey and Greece, underscoring the necessity for caution regarding the generalisability and external validity of the findings. The 16-year dataset employed in this analysis offers valuable insights, but its scope is limited, particularly in terms of addressing longitudinal effects. Further research could utilise datasets covering a greater timescale and consider the impact of healthcare policy changes over longer periods. Furthermore, although this study incorporated some indicators of deprivation in relation to health services and socio-economic factors, it did not assess the challenges faced by those with limited resources in accessing health services. It would be beneficial for future research to investigate this aspect further in order to gain a deeper understanding of the barriers to healthcare access. Furthermore, an investigation into the relationship between individuals from deprived backgrounds and their family physicians could provide valuable insights into how primary care accessibility affects the incidence of catastrophic expenditures.

It is further recommended that future studies investigate additional variables, including regional healthcare disparities, healthcare quality, and public perceptions of healthcare access, in order to gain a more comprehensive understanding of the factors contributing to catastrophic health expenditures. Furthermore, qualitative research that captures the opinions and experiences of individuals who are deprived of health services could complement the findings of quantitative studies and enhance the policy implications. By addressing these limitations and recommendations, future research can further elucidate the complex dynamics underlying catastrophic health expenditures and inform the development of more equitable and effective healthcare systems in Turkey, Greece, and beyond.

References

Acemoglu, D., Johnson, S., Kermani, A., Kwak, J., & Mitton, T. (2016). The value of connections in turbulent times: Evidence from the United States. *Journal of Financial Economics, 121*(2), 368–391. https://doi.org/10.1016/j.jfineco.2015.10.001

Alem, Y., & Köhlin, G. (2014). The persistence of subjective poverty in urban Ethiopia. *World Development, 56*, 51–61.

Aregbeshola, B. S., & Khan, S. M. (2018). Out-of-pocket payments, catastrophic health expenditure, and poverty among households in Nigeria 2010. *International Journal of Health Policy and Management, 7*(9), 798–806. https://doi.org/10.15171/ijhpm.2018.19

Arsenijevic, J., Pavlova, M., Rechel, B., & Groot, W. (2016). Catastrophic healthcare expenditure among older people with chronic diseases in 15 European countries. *PLOS ONE, 11*(7), e0157765. https://doi.org/10.1371/journal.pone.0157765

Azzopardi-Muscat, N., Buttigieg, S., Calleja, N., & Merkur, S. (2017). Malta: Health system review. *Health Systems in Transition, 19*(1), 1–137.

Bijlmakers, L., Wagemakers, A., van der Horst, M., Mkandawire, M., & Broekhuizen, H. (2019). Out-of-pocket payments and catastrophic household expenditure to access essential surgery in Malawi: A cross-sectional patient survey. *Annals of Medicine and Surgery, 43*, 85–90. https://doi.org/10.1016/j.amsu.2019.06.003

Boyer, L., Baumstarck, K., Iordanova, T., Fernandez, J., Jean, P., & Auquier, P. (2014). A poverty-related quality-of-life questionnaire can help to detect health inequalities in emergency departments. *Journal of Clinical Epidemiology,*

67(3), 285–295. https://doi.org/10.1016/j.jclinepi.2013.07.021

Brown, S., Hole, A. R., & Kilic, D. (2014). Out-of-pocket health-care expenditure in Turkey: Analysis of the 2003–2008 household budget surveys. *Economic Modelling, 41*, 211–218.

Chowdhury, A. M. R., Bhuiya, A., Chowdhury, M. E., Rasheed, S., Hussain, Z., & Chen, L. C. (2013). The Bangladesh paradox: Exceptional health achievement despite economic poverty. *The Lancet, 382*(9906), 1734–1745. https://doi.org/10.1016/S0140-6736(13)62148-0

Çelik, M. (2020, March 12). *En küçük kareler yöntemi (Least squares method)* [Video]. YouTube. https://www.youtube.com/watch?v=zokkncTmkfU

Çıraklı, Ü. (2018). The impact of the 2009 economic crisis and 2007 legislation amendment on the household rate with catastrophic health expenditures. *Social Sciences Studies Journal, 4*(22), 3862–3869.

Demir, H., & Kurt, M. (2017). Yolsuzluk ve katastrofik sağlık harcamaları [Corruption and catastrophic health expenditures]. *Dicle University Journal of Faculty of Economics and Administrative Sciences, 7*(14), 363–384.

Devadasan, N., Criel, B., Van Damme, W., Ranson, K., & Van Der Stuyft, P. (2007). Indian community health-insurance schemes provide partial protection against catastrophic health expenditure. *BMC Health Services Research, 7*, 43. https://doi.org/10.1186/1472-6963-7-43

Dinler, Z. M., & Akbolat, M. (2023). Sağlık hizmetlerinden yoksunluk göstergeleri açısından Türkiye ve seçilmiş OECD ülkelerinin karşılaştırılması [The comparison of Turkey and some selected OECD countries in terms of health-care deprivation indicators]. *Süleyman Demirel University Visionary Journal, 14*(100th Anniversary Special Issue), 305–318.

Economou, C., Kaitelidou, D., Kentikelenis, A., Maresso, A., & Sissouras, A. (2015). The impact of the crisis on the health system and health in Greece. In *Economic crisis, health systems and health in Europe: Country experience*. European Observatory on Health Systems and Policies.

Expenditure, C. H. (2016). Catastrophic health expenditure. In *The SAGE encyclopedia of world poverty* (3rd ed.). SAGE Publications. https://doi.org/10.5860/choice.196918

Galárraga, O., Sosa-Rubí, S. G., Salinas-Rodríguez, A., & Sesma-Vázquez, S. (2010). Health insurance for the poor: Impact on catastrophic and out-of-pocket health expenditures in Mexico. *The European Journal of Health Economics, 11*, 437–447.

Gilthorpe, M. S., & Wilson, R. C. (2003). Rural/urban differences in the association between deprivation and health-care utilization. *Social Science & Medicine, 57*(11), 2055–2063. https://doi.org/10.1016/S0277-9536(03)00071-6

Gujarati, D. N. (2011). *Temel ekonometri* (Ü. Şenesen & G. Günlük Şenesen, Trans.). Literatür Yayıncılık.

Hatt, L. E. (2006). *Measuring risk factors for catastrophic health expenditures in Peru and their effects on families over time* [Doctoral dissertation, Boston University]. ProQuest Dissertations Publishing.

Ilunga-Ilunga, F., Levêque, A., Laokri, S., & Dramaix, M. (2015). Incidence of catastrophic health expenditures for households: An example of medical attention for the treatment of severe childhood malaria in Kinshasa reference hospitals, Democratic Republic of Congo. *Journal of Infection and Public Health, 8*(2), 136–144. https://doi.org/10.1016/j.jiph.2014.08.008

Karagöz, Y. (2014). *SPSS 21.1 uygulamalı biyoistatistik*. Nobel Yayın Dağıtım.

Kasapoğlu, A. (2016). Türkiye'de sağlık hizmetlerinin dönüşümü. *Sosyoloji Derneği Dergisi, 19*(2), 132–172.

Kelly, H. (2018). Putting families at the heart of their baby's care. *Journal of Neonatal Nursing, 24*(1), 13–16. https://doi.org/10.1016/j.jnn.2017.11.005

Köktaş, A. M., & Eren, A. A. (2017). Katastrofik sağlık harcaması: Literatür taraması [Catastrophic health expenditure: A literature review]. *Fiscaoeconomia, Special Issue 1*, 1–4.

Lavers, T. (2019). Towards universal health coverage in Ethiopia's "developmental state"? The political drivers of health insurance. *Social Science & Medicine, 228*, 60–67. https://doi.org/10.1016/j.socscimed.2019.03.007

Leng, A., Jing, J., Nicholas, S., & Wang, J. (2019). Catastrophic health expenditure of cancer patients at the end-of-life: A retrospective observational study in China. *BMC Palliative Care, 18*, 1. https://doi.org/10.1186/s12904-019-0426-5

Martin, D., Miller, A. P., Quesnel-Vallée, A., Caron, N. R., Vissandjée, B., & Marchildon, G. P. (2018). Canada's universal health-care system: Achieving its potential. *The Lancet, 391*(10131), 1718–1735.

Metin, B. (2013). Neoliberal yapısal uyum politikalarından "kapsayıcı kalkınma çerçevesine": Dünya Bankası'nın yoksulluk sorununa yaklaşımı. *Çalışma ve Toplum, 2*(37), 211–234.

Odekon, M. (Ed.). (2015). *The SAGE encyclopedia of world poverty* (2nd ed.). SAGE Publications. https://doi.org/10.4135/9781483345727

Organisation for Economic Co-operation and Development.

(2020). *Health status*. Retrieved October 23, 2020, from https://stats.oecd.org/index.aspx?DataSetCode=HEALTH_STAT

Papanicolas, I., & Smith, P. C. (Eds.). (2013). *Health system performance comparison*. World Health Organization.

Pavlušová, M. (2018). Chronic heart failure – Impact of the condition on patients and the health-care system in the Czech Republic: A retrospective cost-of-illness analysis. *Cor Vasa*, *60*(3), e224–e233. https://doi.org/10.1016/j.crvasa.2018.03.002

Prentice, J. C., & Pizer, S. D. (2007). Delayed access to health care and mortality. *Health Services Research*, *42*(2), 644–662. https://doi.org/10.1111/j.1475-6773.2006.00626.x

Raj, B., & Baltagi, B. H. (Eds.). (2012). *Panel data analysis*. Springer.

Rice, T., Rosenau, P., Unruh, L., Barnes, A., Saltman, R., & Van Ginneken, E. (2013). United States of America: Health-system review. *Health Systems in Transition*, *15*(3), 1–431. European Observatory on Health Systems and Policies.

Seeberg, J., Pannarunothai, S., Padmawati, R. S., Trisnantoro, L., Barua, N., & Pandav, C. S. (2014). Treatment seeking and health financing in selected poor urban neighbourhoods in India, Indonesia, and Thailand. *Social Science & Medicine*, *102*, 49–57. https://doi.org/10.1016/j.socscimed.2013.11.039

Sims, A. (2006). *Deprivation and health: Social inequality and equity of access to healthcare services* [Master's thesis, Sheffield Hallam University]. SHURA.

Şimşek, K. O., Doğruyol, A. R., & Özgülnar, N. (2022). COVID-19 pandemisinde sağlık sistemleri: Yunanistan. *Toplum ve Hekim Dergisi*, *37*(4), 1–12.

Tokatlıoğlu, Y., & Tokatlıoğlu, İ. (2018). Catastrophic health expenditures in Turkey and the determinants of these expenditures: 2002–2014 period. *Sosyoekonomi*, *26*(35), 59–78. https://doi.org/10.17233/sosyoekonomi.302930

TÜİK. (2020). *Bölgesel istatistikler (Regional statistics)*. Retrieved October 23, 2020, from https://biruni.tuik.gov.tr/bolgeselistatistik/anaSayfa.do?dil=tr

Türkiye Statistical Institute. (2020). *Statistical indicators*. Retrieved February 21, 2023, from https://data.tuik.gov.tr

Vahedi, S., Rezapour, A., Faraji Khiavi, F., Esmaeilzadeh, F., Javan-Noughabi, J., Almasiankia, A., & Ghanbari, A. (2020). Decomposition of socioeconomic inequality in catastrophic health expenditure: Evidence from Iran. *Clinical Epidemiology and Global Health*, *8*(2), 437–441. https://doi.org/10.1016/j.cegh.2019.10.004

World Bank. (2005). *World health report*. Retrieved November 19, 2020, from https://www.who.int/whr/2005/en/

Xu, K., Evans, D. B., Kawabata, K., Zeramdini, R., Klavus, J., & Murray, C. J. L. (2003). Household catastrophic health expenditure: A multicountry analysis. *The Lancet*, *362*(9378), 111–117. https://doi.org/10.1016/S0140-6736(03)13861-5

Yap, A., Fitzgerald, T. N., Mergesa, B., Kisuule, F., Namukwaya, H., & Sekabira, J. (2018). From procedure to poverty: Out-of-pocket and catastrophic expenditure for paediatric surgery in Uganda. *Journal of Surgical Research*, *232*, 484–491. https://doi.org/10.1016/j.jss.2018.05.077

Yardım, M. S., Cilingiroglu, N., & Yardım, N. (2010). Catastrophic health expenditure and impoverishment in Turkey. *Health Policy*, *94*(1), 26–33. https://doi.org/10.1016/j.healthpol.2009.08.006

Yılmaz, F., & Yılmaz, B. (2017). Birinci basamak sağlık hizmetlerinde yoksunluk anketinin DiPCare Q Türkçe geçerlik ve güvenirlik çalışması. *Turkish Journal of Family Medicine and Primary Care*, *11*(2), 79–87.

Zhao, Y., Zhang, L., Zhao, S., & Zhang, L. (2019). Impact of multimorbidity on health-service use and catastrophic health expenditure in China: An analysis of data from a nationwide longitudinal survey. *The Lancet*, *394*(1), S69. https://doi.org/10.1016/S0140-6736(19)32405-5