RESEARCH ARTICLE

Overall mortality trends in Greece during the first period of austerity and the economic crisis (2009-2015)

Fountoulakis KN[1], Fountoulakis NK[2], Theodorakis PN[3], Souliotis K[4]

[1]3rd Department of Psychiatry, School of Medicine, Aristotle University of Thessaloniki, Greece
[2]Faculty of Medicine, Medical University of Sofia, Bulgaria
[3]WHO Regional Office for Europe, Copenhagen, Denmark
[4]Faculty of Social and Political Sciences, University of Peloponnese, Greece

Abstract

Objectives: The economic crisis and the resulting austerity in Greece led to a drastic reduction in healthcare spending, which has been assumed to have impacted people's health. This paper discusses official standardized mortality rates in Greece between 2000 and 2015.

Methods: This study was designed to analyze population-level data and collected data from the World Bank, the Organisation for Economic Co-operation and Development, Eurostat, and the Hellenic Statistics Authority. Separate linear regression models were developed for the periods before and after the crisis and were compared.

Results: Standardized mortality rates do not support a previously reported assumption of a specific and direct negative effect of austerity on global mortality. Standardized rates continued to decrease linearly, and their correlation to economic variables changed after 2009. Total infant mortality rates show an overall rising trend since 2009, but the interpretation is unclear because of the reduction in the absolute number of deliveries.

Conclusions: The mortality data from the first six years of the financial crisis in Greece and the decade that preceded do not support the assumption that budget cuts in health are related to the dramatic worsening of the overall health of the Greek people. Still, data suggest an increase in specific causes of death and the burden on a dysfunctional and unprepared health system that is working in an overstretched manner trying to meet needs. The dramatic acceleration of the aging of the population constitutes a specific challenge for the health system. HIPPOKRATIA 2022, 26 (3):98-104.

Keywords: Austerity, mortality, economic crisis, Greece, Europe

Corresponding author: Konstantinos N Fountoulakis, Professor of Psychiatry, 3rd Department of Psychiatry, School of Medicine, Aristotle University of Thessaloniki, 6 Odysseos str (1st Parodos Ampelonon str.), 55535 Pylaia, Thessaloniki, Greece, tel: +302310435702, fax: +302310266570, e-mail: fountoul@auth.gr

Introduction

The economic crisis and the resulting austerity in Greece led to a drastic reduction in total healthcare spending, both public and private. The target for public healthcare spending was to drop below 6 % of the Gross Domestic Product (GDP), and this target was intensively pursued[1]. A number of programs on public health have been scaled back, and hospital budgets were drastically cut, as was pharmaceutical spending[2]. Some authors suggested these cuts directly resulted from International Monetary Fund (IMF) policies[3].

This reduction in overall resources invested in the health care system has caused a major concern that it may reverse a long period of improvements in the health of the Greek people[4-8]. For example, World Health Organization (WHO) data suggested that the decrease in infant mortality that was observed for a long time had been reversed, resulting in a 43 % rise in the relevant indicator between 2008 and 2010, with corresponding increases in neonatal and post-neonatal deaths[5]. A recent analysis of mortality rates in Greece concluded that overall mortality increased disproportionally because of the combination of population aging with austerity. In contrast, age-standardized rates manifested a 50 % slowing down of their annual reduction rate[9].

A significant problem with mortality rates is the fact that the Greek population is gradually aging. Therefore, raw mortality rates may rise, yet, this does not reflect the true mortality rate of the population; it mainly reflects its aging. Standardized rates use is necessary to compare mortality rates over the years.

The current study aims to present actual standardized mortality rates during 2000-2015, discuss potential changes in those rates, and test the hypothesis that the economic crisis is causally related to a negative development. The time frame for our analysis was selected because 2015 may be considered a year marking the end of the first two phases of the Greek financial crisis (including the first half of 2015, which was marked by one election and one referendum to decide on whether to agree

to the European Union Reform Plan for Greece), after which austerity has become embedded both in the operation of the national economy and the collective conscious of the people of Greece.

Methods

This is an analysis of epidemiological-type data available through official services. The analysis took place in 2020, and since it included publicly available data and used no individual patient data, ethical approval was deemed unnecessary.

Economic variables

Data on national GDP were collected from the World Bank dataset. Data on per-capita healthcare expenditure were obtained from the Organisation for Economic Co-operation and Development (OECD) dataset. Detailed age and gender-specific mortality rates were obtained from the Hellenic Statistics Authority (ELSTAT). Unmet needs for medical assessment were retrieved from Eurostat data.

Mortality rates

The authors calculated standardized mortality rates based on the 2001 standard WHO population[10]. These correspond to a population with standard age and composition. The calculation was performed by attributing the changing mortality rates in individual gender-by-age groups to this standardized population and afterward calculating the resulting total standardized rate. Standardizing rates according to this population allows for comparing rates across different countries. All the data are shown in Table 1, Table 2, and Table 3.

Processing of data

Initially, the data regarding all variables underwent a few transformations (adding constant, natural log, exponent, power, inverse power, mean subtraction, standardization, and trend subtracting). Afterward, we performed smoothing using three years moving average. No transformation produced any meaningful results. That is, it did not correspond to some standard distribution or manifest a clear trend, and the series seemed too short to trace any periodicity in the data with cross-correlation. This judgment was made with a visual inspection of the variables' distributions. In the final dataset, the data were smoothed using a 3-year rolling average.

Data analysis

While the reasonable choice of data analysis would be Interrupted Time Series Analysis, this demands at least ten years before and after the breakpoint. Our data needed to be longer for such an analysis. As a result, we chose to use Stepwise Forward Linear Regression Analysis (SFLRA) with an arbitrary choice of breakpoint year.

The first step was to inspect the data (Figure 1) visually. This led to the suggestion that after 2008 there might be a change in trends, which could be attributed to a direct negative effect of austerity on mortality. In 2008 there might be a change in the raw mortality rates, while in 2010, a change is seen in the trend of unmet needs. To test this assumption, we fitted two separate SFLRA models, one for the 2000-2008 years and a second for the 2009-2015 years. Standardized mortality, infant mortality, and stillborn rate were dependent variables in separate analyses, and the economic variables were predictors. To compare the outputs of those models, we used regression analysis with a standardized death rate as the dependent

Table 1: Standardized total death rates for both sexes. Percentages correspond to the total percentage (%) change.

Year	GDP per capita[1]	Growth rate[1]	Per capita health expenditure in USD[1]	Unmet needs for medical assessment[2]	Standardized death rate[3]	Change % in standardized death rate from previous year[3]	Unstandardized Death ratio[4]
2000	12042.95	3.9	1413		534.88		963.32
2001	12538.18	4.1	1678		484.67	-9.39	946.47
2002	14110.31	3.9	1862		483.04	-0.34	954.38
2003	18477.58	5.8	1957		481.11	-0.40	966.76
2004	21955.10	5.1	2019		474.58	-1.36	959.22
2005	22551.74	0.6	2301		465.64	-1.88	957.99
2006	24801.16	5.7	2558		455.18	-2.25	958.46
2007	28827.33	3.3	2653		462.60	**1.63**	995.79
2008	31997.28	-0.3	2895	5.4	443.03	-4.23	976.22
2009*	29710.97	-4.3	2878	5.5	436.10	-1.56	976.28
2010	26917.76	-5.5	2696	5.5	426.46	-2.21	981.03
2011	25916.29	-9.1	2378	7.5	421.52	-1.16	998.79
2012	22242.68	-7.3	2219	8.0	425.28	**0.89**	1052.35
2013	21874.82	-3.2	2175	9.0	400.49	-5.83	1015.98
2014	21673.78	0.4	2099	10.9	395.90	-1.15	1040.93
2015	18007.79	-0.2	2210	12.3	406.64	**2.71**	1116.07
2000-2010	+123.51%		+90.79%		-20.27%		+1.84%
2005-2015	-20.15%		-3.95%		-12.67%		+16.50%
2010-2015	-33.10%		-18.03%		-4.65%		+13.76%
2014-2015	-16.91%		-5.29%		+2.71%		+7.22%

GDP: Gross Domestic Product, USD: United States dollar, [1]: World Bank, [2]: Eurostat, [3]: Calculated by authors, [4]: Hellenic Statistics Authority, *: economic crisis begun.

Table 2: Percentage change in specific causes of death that rose during 2015 [by the International Classification of Diseases 10th Revision (ICD-10) classification codes].

	2005-2015	2010-2015	2014-2015
01. Intestinal infectious diseases	-	-	0.63
07. Other infectious and parasitic diseases and late effects of infectious and parasitic diseases	47.66	177.96	15.88
09. Malignant neoplasm of digestive organs and peritoneum	16.02	13.71	4.04
10. Malignant neoplasm of respiratory and intra thoracic organs	20.12	14.56	2.04
11. Malignant neoplasm of bone, connective tissue, skin and breast	17.50	6.49	6.36
12. Malignant neoplasm of genito-urinary organs	22.64	18.36	2.49
13. Malignant neoplasm of other and unspecified sites	-2.90	-7.01	3.09
15. Benign neoplasm	-	1,922.52	80.68
17. Other and unspecified neoplasm	396.73	364.77	12.03
18. Endocrine and metabolic diseases, immunity disorders	50.79	57.68	4.89
20. Diseases of blood and blood-forming organs	184.88	93.89	8.03
21. Mental disorders	746.77	1,117.38	75.24
22. Diseases of the nervous system	158.93	99.12	18.11
26. Hypertensive disease	211.40	150.09	13.19
27. Ischaemic heart disease	-2.41	11.11	1.47
28. Diseases of pulmonary circulation and other forms of heart disease	-16.34	-21.74	3.59
29. Cerebrovascular disease	-15.27	-0.79	1.80
30. Other diseases of the circulatory system	99.98	125.04	18.78
31. Diseases of the upper respiratory tract	77.06	74.01	25.16
32. Other diseases of the respiratory system	79.61	29.60	16.07
35. Diseases of urinary system	158.96	97.46	32.22
36. Diseases of male genital organs	1,011.34	275.49	38.37
44. Congenital anomalies	-7.18	-27.60	19.05
45. Certain conditions originating in the perinatal period	-1.53	6.28	1.69
46. Signs, symptoms and ill-defined conditions	25.35	5.54	15.67
48. Accidental poisoning	-39.47	0.98	55.33
50. Accidental falls	38.31	67.40	42.12
51. Accidents caused by fire and flames	-12.10	0.10	56.34
52. Other accidents, including late effects	43.47	29.29	29.48

variable and as predictors the surviving variable in the previous models and a dummy variable for condition (0 for 2000-8 and 1 for 2009-15). In additional SFLRA analyses, the unmet needs variable was used for the models corresponding to the years 2009-15 only.

Results

Overall, the visual inspection of standardized rates did not indicate a rise in mortality or a slowing reduction trend after 2009. Interestingly, standardized mortality manifests a yearly spike in three out of four election years after 2005 (2007, 2012, and 2015 but not 2009). These spikes disappear after smoothing with a 3-year rolling average (Figure 1). Individual rates suggest the 2015 spike in mortality is more prominent than previous ones (Table 1, Figure 1) and concerns 29 out of 56 causes of death (51.78 %) (Table 2).

Standardized death rate

For the standardized death rate, the two linear regression models returned the following results:

Years 2000-8: The only surviving variable was the "per capita health expenditure" (intercept =605.24; b =-1.6, adj R^2 =0.79, F =16.859, df =2.6, p =0.003).

Years 2009-15: When the same set of variables as for the previous years was utilized, then again the only sur-

Table 3: Infant mortality and stillborn rates show an overall rising trend since 2009, which, however, is not monotonous.

	Number							Rate per 1,000 deliveries					
			Age in days						Age in days				
Year	N of deliveries	Deaths <12 months	0-6	7-27	28 days - 11 months	Stillborn	Total still born and dead within the first year	Deaths <12 months rate	0-6	7-27	28 days - 11 months	Stillbornrate	Total still born and dead within the first year rate
2000	103,274	561	278	123	160	540	1101	5.43	2.69	1.19	1.55	5.23	10.66
2001	102,282	522	235	129	158	588	1110	5.10	2.30	1.26	1.54	5.75	10.85
2002	103,569	530	241	121	168	510	1040	5.12	2.33	1.17	1.62	4.92	10.04
2003	104,420	420	186	96	138	504	924	4.02	1.78	0.92	1.32	4.83	8.85
2004	105,655	429	190	87	152	477	906	4.06	1.80	0.82	1.44	4.51	8.58
2005	107,545	409	190	94	125	421	830	3.80	1.77	0.87	1.16	3.91	7.72
2006	112,042	415	180	101	134	376	791	3.70	1.61	0.90	1.20	3.36	7.06
2007	111,926	397	164	88	145	434	831	3.55	1.47	0.79	1.30	3.88	7.42
2008	118,302	314	130	82	102	392	706	2.65	1.10	0.69	0.86	3.31	5.97
2009	117,433	371	146	92	133	505	876	3.16	1.24	0.78	1.13	4.30	7.46
2010	114,766	436	176	108	152	500	936	3.80	1.53	0.94	1.32	4.36	8.16
2011	106,428	357	143	91	123	431	788	3.35	1.34	0.86	1.16	4.05	7.40
2012	100,371	293	123	66	104	446	739	2.92	1.23	0.66	1.04	4.44	7.36
2013	94,134	347	172	77	98	376	723	3.69	1.83	0.82	1.04	3.99	7.68
2014	92,148	346	165	72	108	353	699	3.75	1.79	0.78	1.17	3.83	7.59
2015	91,847	364	179	81	102	312	676	3.96	1.95	0.88	1.11	3.40	7.36

N: number.

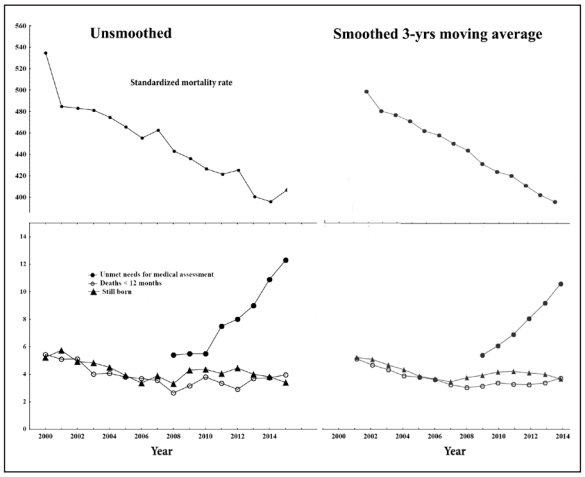

Figure 1: Trends in mortality and "unmet needs" in Greece during 2000-2015.

viving variable was the "per capita health expenditure" (intercept =325.79; b =0.677, R^2 =0.87, F =13.855, df =2.4, p =0.015). When the variable "unmet needs" was included, the model was not significant (p =0.059).

The SFLRA, which compared the two models, suggested a significant effect of the dummy variable representing the two models (b =-0.73) and a significant negative overall effect of "per capita health expenditure" (b =-0.32). The difference was highly significant (R^2 =0.77, F =21.906, df =2.13, p =0.00006)

Infant mortality rate

For the infant mortality rate (Table 3), the two linear regression models returned the following results:

Years 2000-8: The only surviving variable was the "GDP per capita" (intercept =6.694; b =-0.97, adj R^2 =0.92, F =98.799, df =1.7, p =0.00002).

Years 2009-15: In both analyses, the models were not significant.

This made the comparison useless as the models differed by definition between the two time periods.

Stillborn rate

For the stillborn rate (Table 3), the two linear regression models returned the following results:

Years 2000-8: The only surviving variable was the "per capita health expenditure" (intercept =7.879; b =-0.93, adj R^2 =0.84, F =43.010, df =1.7, p =0.0003).

Years 2009-15: When the same set of variables as for the previous years was utilized, the model was not significant. When the variable "unmet needs" was included, then this specific variable survived (intercept =7.514; b =-1.4, R^2 =0.89, F =16.594, df =2.4, p =0.015).

These results make the comparison useless as the models differed by definition between the two time periods.

Discussion

The main finding of this study

The visual inspection of the data suggested that in Greece and despite the economic crisis, standardized mortality rates continued to decline after 2009, with the decreasing trend that was prevalent before 2009 continuing after the economic crisis emerged without any signs of slowing down, except for three yearly spikes that corresponded to three out of four election years after 2005 (2007, 2012, and 2015 but not 2009). The 2015 spike is almost twice as big as in 2007 and three times bigger

than in 2012, suggesting that the health system is holding itself together but with increasing difficulty. The spikes disappear after smoothing the data; however, their temporal relationship with political events is intriguing. This is in sharp contrast to the findings of a recent analysis, which utilized different raw and standardized mortality rates that do not correspond to the official ELSTAT reported data[9]. However, the piecewise regression analysis suggested a disengagement of the variables correlated with mortality rates before the economic crises as mortality rates continued to drop.

In 2015, the rise in mortality rates concerned 29 out of 56 causes of death, with the most significant increase in benign neoplasms, followed by mental disorders, both of which do not constitute final causes of death. These were followed by various accidents, diseases of the genito-urinary systems, circulatory, respiratory, and nervous systems, as well as infectious and parasitic diseases. Deaths due to malignant neoplasms also rose. The economic crisis and austerity measures had a different impacts on individual causes of death. This is in accord with recent articles in the literature concerning the complex and differential impact of austerity on mortality rates in Europe[11-22] and other parts of the world[3,23]. However, our analysis has different conclusions in comparison to previous from Greece[9], and it agrees with a previous report which compared Greece, Iceland, and Finland[22]. According to the WHO, all causes of mortality are also reported to be lower in terms of standardized rates compared to Austria, Belgium, Denmark, Finland, France, Germany, Portugal, and the USA[24].

Total infant mortality (pooled deaths before the age of 12 months and stillborn) rates show an overall rising trend since 2009 which, however, is not monotonous and is highly heterogeneous. According to the OECD, infant mortality rates in Greece are continuously improving and are consistently better than that of Germany, France, Denmark, Austria, Belgium, the Netherlands, Switzerland, the UK, Australia, Canada, and the US, which are richer countries with more advanced health care systems. It has been mentioned in previous publications that the WHO data may have indicated that the long-term decrease in infant mortality had been reversed, resulting in a 43 % rise between 2008 and 2010, with corresponding increases in neonatal and post-neonatal deaths[5]. This rate has since stabilized, and the decrease in the stillborn rate was reflected in further decreases in the overall infant death rate. The critical question is whether this negative development in infant mortality rates is genuine or the product of the interaction between fewer total deliveries and stable rates of deliveries, specifically in couples of lower socio-economic status. Also, the piecewise regression analysis here points to a correlation change with economic variables after 2009.

While there were some correlations between economic variables and mortality rates, they are probably spurious because decreasing mortality trends are stable, and the correlation models changed after 2009. It is important to note that, while health spending stabilized after 2013, unmet medical needs continued to rise due to barriers to access to health care[25-28].

What is already known on this topic

There is limited literature on the rise in mortality rates due to the recent economic crisis in Europe; however, it has been reported that a rise in overall mortality occurred throughout Europe[14], in the UK[21,29,30] as well as in Spain[15,19,20] and Greece[9]. However, such an effect has been strongly disputed for Europe as a whole[12] as well as for Spain[13,17,18], and it seems that the literature ought to be more balanced with biased reports[11]. In Europe, the 2008 crisis triggered changes and cuts in healthcare systems throughout the continent with varying success[31]. It has even been reported that efforts by the staff to compensate for budget cuts might put patients at a higher risk; for instance, an increase in a nurse's workload by one patient increases the likelihood of an inpatient dying within 30 days of admission by 7 %[32]. Concerning Greece, the single previous report suggesting an increase in mortality rates[9] utilized problematic unstandardized rates and thus failed to consider the population's changing composition. The differences between raw and standardized rates and the different conclusions these different calculations lead to are shown in Table 1. In that previous study, an annualized reduction of 1.6 % in standardized rates between 2000-2010 was reported compared to the correct 2.03 %. For the years 2010-2016, the reported reduction was similar to that found in the current study (Table 1). The claim of that study that after 2010 the reduction rate of standardized rates declined by 50 % is not supported by our data and our analysis (Table 1, Figure 1).

The international experience of the impact of austerity on public health needs to be more extensive and more adequately researched and published[3]. In Costa Rica, the marked health improvements experienced during the 1970s ceased and, in some instances, reversed during the economic crisis of the 1980s. In 1982, the Costa Rican health sector became the center of a nationwide debate, which ended in 1986 without dramatic changes[33]. Austerity in Brazil was reported to have increased child mortality[23], which is in accord with the general findings of our study.

What the current study adds

The Greek healthcare system has been accumulating structural problems since its establishment in the early 1980s. Any effort for its reform during the last several years has been focused almost exclusively on reducing expenditure horizontally without really examining the impact such horizontal cuts might have on population needs and the extent to which defined unmet needs could be addressed with different funding levels.

Our analysis does not support the hypothesis of a massive collapse in the health of the Greek people in terms of mortality after the economic crisis started and until 2015. However, some data are suggestive of an increase in the

burden an unprepared health system that was characterized by unregulated overspending has to shoulder and its inability to meet the health needs of an aging population, which is expected to inevitably further increase in the future and be reflected in future (rising) mortality rates. As data for the years following 2015 become available, we must continue to study the impact of economic crisis and economic variables not only on mortality rates but also on specific causes of death and population health needs if to meet demand with restricted resources eventually. This developing picture may reveal whether we face a humanistic tragedy or a paradoxical resilience.

Comments

Some authors suggest that healthcare spending should not be aggressively targeted by austerity measures[34] mainly because it seems that austerity measures hit the sickest hardest[35]. Tradeoffs may occur not only within a single area in public health but also on a broader, more abstract level. The most frequently encountered tradeoffs were "insufficient funding for a program versus no funding for a program" and prioritizing "current versus future need"[36]. Thus, mental health programs[37] and prevention programs are among the first "victims" of austerity. Therefore, it is essential to maintain a strategic commitment to these areas, with an emphasis on providing information and support to individuals towards changing their lifestyles to avoid lifestyle-related morbidity and mortality[38].

The current paper identifies several areas with a tendency for increased mortality which also needs further research and probably focused attention. Unfortunately, the use of Time series analysis was not possible because more extended series of data is needed, and using SFLRA with breakpoints was the best possible as data do not seem linear but still an arbitrary choice. Also, the visual inspection of charts is an inaccurate method, but still, it is legitimate with specific advantages and disadvantages. In any case, visual inspection was used only for theory development, and the theory was tested with SFLRA.

Although no apparent effect of the austerity measures on infant mortality could be detected in this study, there were evident effects on unmet needs. However, unmet needs are a "soft" outcome derived from self-reporting polls, while mortality is the "hardest" outcome of all.

The yearly spikes in three out of four election years after 2005 could well be a coincidence, but it is unnecessary to be present in all four elections to be meaningful. This complete temporal identification is rare in the real world and science. It could be an unknown effect of the turmoil elections could cause in society in Greece.

Finally, concerning the variables used, GDP and GDP growth are related but not identical. GDP also gives a measure of baseline, while growth reflects pure change. GDP through time also differs from GDP growth through time because the second lags one year. Structural multicollinearity among variables is the rule rather than the exception in this kind of dataset. Interestingly, the results lead to the development of different models depending on the period and the outcome concerned. This is neither random nor incomprehensible. For example, one peculiarity of the health system in Greece is the high out-of-pocket payments, which are less in adult severe and terminal diseases (thus, GDP health expenditure is important). However, it is a lot concerning pediatric issues (this is why GDP per capita matters in child mortality).

Limitations of this study

The study utilized population-level data; thus, it is impossible to go deep beyond a certain point in the analysis of variables, subgroups, and specific cause-and-effect relationships. Inevitably the number of observations (corresponding to the number of years) is small, limiting the power of the statistical analysis.

Unfortunately, as already mentioned, the use of Time series analysis was not possible because more extended series of data is needed, and using SFLRA with breakpoints was the best possible, but still an arbitrary choice. Also, the visual inspection of charts is an inaccurate method but still legitimate. The variable "unmet needs" is a "soft" outcome; it is derived from self-reporting polls. Also, concerning the economic variables used, they manifest a significant degree of conceptual overlapping. However, this structural multicollinearity among variables is the rule rather than the exception in this kind of dataset.

Furthermore, it is not right to rush to conclude as it is not expected that all the consequences in mortality rates as a result of economic crisis to be evident in the early years of the phenomenon. The latency time of such an impact is unknown, and the results could well appear after even a decade.

Conflict of interest

Authors declare no conflicts of interest.

References

1. European Commission - Directorate General Economic and Financial Affairs. The Second Economic Adjustment Programme for Greece, Second Review - May 2013. European Economy. Occasional Papers 148 / May 2013, Available at: https://ec.europa.eu/economy_finance/publications/occasional_paper/2013/pdf/ocp148_en.pdf, date accessed: 31/6/2022.
2. Karamanoli E. Debt crisis strains Greece's ailing health system. Lancet. 2011; 378: 303-304.
3. Stuckler D, Basu S. The International Monetary Fund's effects on global health: before and after the 2008 financial crisis. Int J Health Serv. 2009; 39: 771-781.
4. Health in austerity: hard decisions for hard times. Lancet. 2014; 383: 670.
5. Kentikelenis A, Karanikolos M, Reeves A, McKee M, Stuckler D. Austerity and health in Greece - authors' reply. Lancet. 2014; 383: 1544-1545.
6. Kentikelenis A, Papanicolas I. Economic crisis, austerity and the Greek public health system. Eur J Public Health. 2012; 22: 4-5.
7. Kondilis E, Giannakopoulos S, Gavana M, Ierodiakonou I, Waitzkin H, Benos A. Economic crisis, restrictive policies, and the population's health and health care: the Greek case. Am J Public Health. 2013; 103: 973-979.
8. Kentikelenis AE, Stubbs TH, King LP. Structural adjustment and

public spending on health: evidence from IMF programs in low-income countries. Soc Sci Med. 2015; 126: 169-176.
9. Global Burden of Disease 2016 Greece Collaborators. The burden of disease in Greece, health loss, risk factors, and health financing, 2000-16: an analysis of the Global Burden of Disease Study 2016. Lancet Public Health. 2018; 3: e395-e406.
10. Ahmad O, Boschi-Pinto C, Lopez A, Murray C, Lozano R, M I. Age standardization of rates: a new WHO standard 2001 Feb 18, 2015. Available at: http://www.who.int/healthinfo/paper31.pdf, date accessed: 31/6/2022.
11. Parmar D, Stavropoulou C, Ioannidis JP. Health outcomes during the 2008 financial crisis in Europe: systematic literature review. BMJ. 2016; 354: i4588.
12. Toffolutti V, Suhrcke M. Does austerity really kill? Econ Hum Biol. 2019; 33: 211-223.
13. Regidor E, Mateo A, Barrio G, Fuente L. Mortality in Spain in the Context of the Economic Crisis and Austerity Policies. Am J Public Health. 2019; 109: 1043-1049.
14. Rajmil L, Fernández de Sanmamed MJ. Austerity Policies and Mortality Rates in European Countries, 2011-2015. Am J Public Health. 2019; 109: 768-770.
15. Moreno-Lostao A, Barrio G, Sordo L, Cea-Soriano L, Martínez D, Regidor E. Mortality in working-age population during the Great Recession and austerity in Spain. PLoS One. 2019; 14: e0218410.
16. Ferrando J, Palència L, Gotsens M, Puig-Barrachina V, Marí-Dell'Olmo M, Rodríguez-Sanz M, et al. Trends in cancer mortality in Spain: the influence of the financial crisis. Gac Sanit. 2019; 33: 229-234.
17. Collins C. Austerity and Mortality in Spain: The Perils of Overcorrecting an Analytic Mistake. Am J Public Health. 2019; 109: 963-965.
18. Hernández-Quevedo C, Lopez-Valcarcel BG, Porta M. Short-Term Adverse Effects of Austerity Policies on Mortality Rates: What Could Their Real Magnitude Be? Am J Public Health. 2018; 108: 983-985.
19. Cabrera de León A, Rodríguez IM, Gannar F, Pedrero García AJ, González DA, Rodríguez Pérez MDC, et al. Austerity Policies and Mortality in Spain After the Financial Crisis of 2008. Am J Public Health. 2018; 108: 1091-1098.
20. Lopez-Valcarcel BG, Barber P. Economic Crisis, Austerity Policies, Health and Fairness: Lessons Learned in Spain. Appl Health Econ Health Policy. 2017; 15: 13-21.
21. Loopstra R, McKee M, Katikireddi SV, Taylor-Robinson D, Barr B, Stuckler D. Austerity and old-age mortality in England: a longitudinal cross-local area analysis, 2007-2013. J R Soc Med. 2016; 109: 109-116.
22. Tapia Granados JA, Rodriguez JM. Health, economic crisis, and austerity: A comparison of Greece, Finland and Iceland. Health Policy. 2015; 119: 941-953.
23. Rasella D, Basu S, Hone T, Paes-Sousa R, Ocké-Reis CO, Millett C. Child morbidity and mortality associated with alternative policy responses to the economic crisis in Brazil: A nationwide microsimulation study. PLoS Med. 2018; 15: e1002570.
24. World Health Organization. WHO Mortality Database 2015. Available at: http://apps.who.int/healthinfo/statistics/mortality/whodpms/, date accessed: 31/6/2022.
25. Souliotis K, Papageorgiou M, Politi A, Ioakeimidis D, Sidiropoulos P. Barriers to accessing biologic treatment for rheumatoid arthritis in Greece: the unseen impact of the fiscal crisis--the Health Outcomes Patient Environment (HOPE) study. Rheumatol Int. 2014; 34: 25-33.
26. Souliotis K, Alexopoulou E, Papageorgiou M, Politi A, Litsa P, Contiades X. Access to Care for Multiple Sclerosis in Times of Economic Crisis in Greece--the HOPE II Study. Int J Health Policy Manag. 2015; 5: 83-89.
27. Souliotis K, Agapidaki E, Papageorgiou M, Voudouri N, Contiades X. Access to treatment for Hepatitis C among injection drug users: results from the cross-sectional HOPE IV study. Int J Equity Health. 2017; 16: 101.
28. Souliotis K, Agapidaki E, Papageorgiou M. Healthcare access for cancer patients in the era of economic crisis. Results from the HOPE III study. Forum Clin Oncol. 2015; 6: 7-11.
29. Watkins J, Wulaningsih W, Da Zhou C, Marshall DC, Sylianteng GDC, Dela Rosa PG, et al. Effects of health and social care spending constraints on mortality in England: a time trend analysis. BMJ Open. 2017; 7: e017722.
30. Karanikolos M, Mladovsky P, Cylus J, Thomson S, Basu S, Stuckler D, et al. Financial crisis, austerity, and health in Europe. Lancet. 2013; 381: 1323-1331.
31. Lai T, Habicht T, Kahur K, Reinap M, Kiivet R, van Ginneken E. Estonia: health system review. Health Syst Transit. 2013; 15: 1-196.
32. Aiken LH, Sloane DM, Bruyneel L, Van den Heede K, Griffiths P, Busse R, et al. Nurse staffing and education and hospital mortality in nine European countries: a retrospective observational study. Lancet. 2014; 383: 1824-1830.
33. Morgan LM. Health without wealth? Costa Rica's health system under economic crisis. J Public Health Policy. 1987; 8: 86-105.
34. Albalate D, Fernández L, Yarygina A. The road against fatalities: infrastructure spending vs. regulation?? Accid Anal Prev. 2013; 59: 227-239.
35. Taylor-Robinson D, Gosling R, Harrison D, Khan M, Barr B. Austerity measures hit the sickest hardest. BMJ. 2013; 347: f4208.
36. Leider JP, Resnick B, Kass N. Tradeoffs in resource allocation at state health agencies. J Public Health Manag Pract. 2014; 20: 566-579.
37. Wahlbeck K, McDaid D. Actions to alleviate the mental health impact of the economic crisis. World Psychiatry. 2012; 11: 139-145.
38. Hale J, Phillips CJ, Jewell T. Making the economic case for prevention--a view from Wales. BMC Public Health. 2012; 12: 460.