

Lockdown During COVID-19: The Greek Success

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Abstract. *Background/Aim: Coronavirus is an ongoing pandemic challenging health systems worldwide. The aim of this report was to evaluate the effectiveness of lockdown in different countries, highlighting the performance of Greek society and authorities. Methods: We analyzed publicly available data from the “Worldometer”. We evaluated the efficacy of lockdown at one month after implementation. Delta Days (DD) referred to the difference in the days of reaching 1 case/million people to the adoption of lockdown. Results: Higher healthcare expenditure as % of the national GDP was not correlated with better 30-day mortality outcomes. DD index was significantly correlated to the incidence of COVID-19 per million people at 30 days (p -value=0.001). The correlation between DD and 30-day mortality was not statistically significant (p -value=0.087). Conclusion: Early lockdown was proven to be the appropriate policy to limit the spread of COVID-19. Greece was a success story in preventing spread despite limited resources.*

Coronavirus 2 is the cause of an ongoing international outbreak of a respiratory illness, known as coronavirus disease 2019 (COVID-19) (1). It consists of the largest epidemic since the swine flu outbreak in 2009, claiming more than 300,000 deaths until today (2). This pandemic is proved to be a major public health challenge for health systems internationally, exceeding the capacity of intensive care units and means of mechanical ventilation as expected from the available models (3). Since the outbreak of the disease, the major targets for its successful management

were the deployment of massive, reliable testing methods, identification of successful treatments and prevention of health system oversaturation.

Greece reported its first confirmed case on February 26th (4). Greek Health authorities preemptively announced a series of measures to limit the spread of the disease. In the same frame, 13 reporting hospitals with expertise have been designated to manage these cases (4). Definitely, COVID-19 posed an unprecedented challenge to Greece’s healthcare system for many reasons. Besides the obvious concerns for the disease-related mortality (1) that mandates preparation for managing this pandemic at the level of individual and public health, a slowly recovering economy after a decade of financial regression seems vulnerable to its global and local effects (5). All measures are predicted to have disruptive effects on the economy, especially as far as the access to the supply of goods, services, and an increase in unemployment (6).

The aim of our analysis was to evaluate the effectiveness of the lockdown measures at an international scale, taking into consideration the mixture of policies, the healthcare-directed expenditure and the outcomes in terms of incidence and COVID-19-related mortality. Was Greece a success story?

Methods

To address this question, we analyzed publicly available data from the “Worldometer”, regarding the effectiveness of the implemented measures to prevent oversaturation of health systems, such as the adoption of early quarantine measures and the large-scale sampling of COVID-19 cases. We evaluated the efficacy of these measures at one month after their implementation, focusing on the 30-day number of confirmed COVID-19 cases and reported deaths per million of population. Since school shutdown was a universally adopted measure, it was selected to represent the starting point of the quarantine. Delta Days (DD) referred to the difference in days of reaching 1 case/million people to the adoption of quarantine. A linear regression analysis was performed to demonstrate the correlations between DD, confirmed cases and reported mortality (STATA 16, College Station, TX, USA). p -Value<0.05 was defined as statistically significant.

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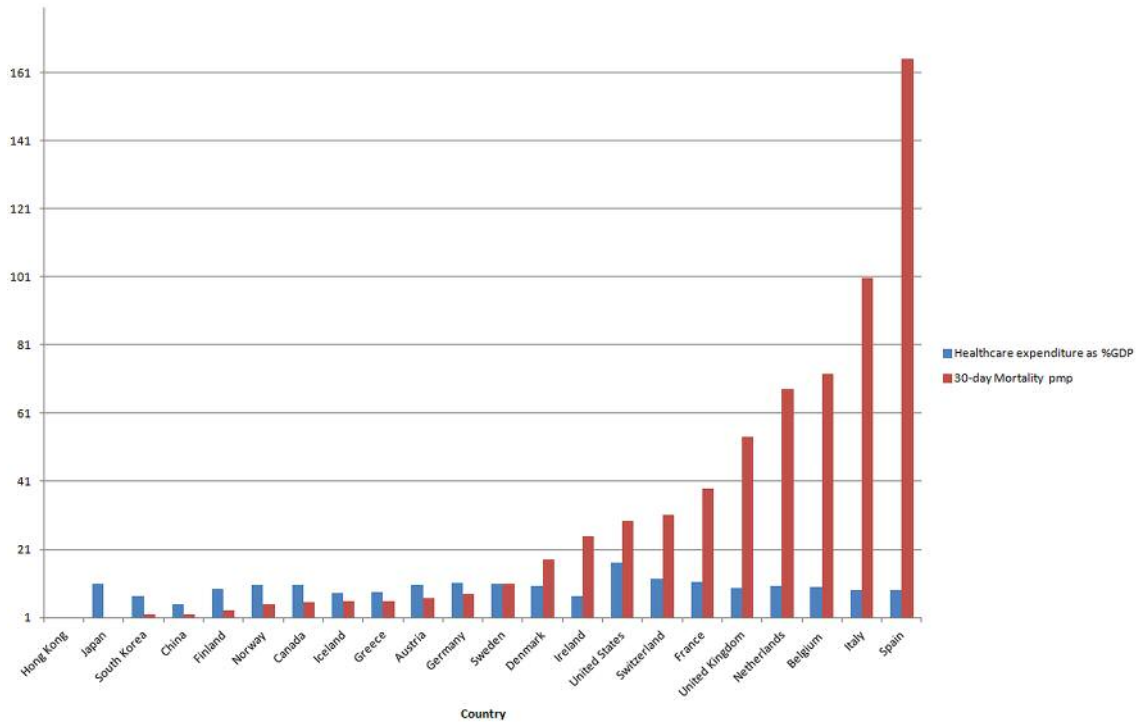


Figure 1. Illustration of the 30-day mortality per million people (pmp) and healthcare expenditure in millions as % of the national GDP.

Results

Iceland and Sweden were the most important examples of the large-scale sampling of the population. The rest of the affected countries implemented the quarantine (lockdown) policy. Table I summarizes the findings of our analysis. The first finding of our analysis was the high heterogeneity in terms of the time of implementation of the lockdown after the documentation of the first COVID-19 positive case. The timeframe, which varied from -1 day to 1 month (31 days), might reflect differences in policies and perception of the magnitude of the disease, with an average of 10.9 days and a median of 12 days. Another interesting finding of our analysis was the fact that higher healthcare expenditure, as % of the national GDP, was not correlated with better 30-day mortality outcomes (Figure 1). This suggests that the policies to prevent disease spread and related mortality are more effective than the policies to rescue, such as more resources directed to treatment and advanced critical care. DD index was significantly correlated to the incidence of COVID-19 per million people at 30 days (p -value=0.001). The correlation between the DD and the 30-day mortality rate per million people was not statistically significant (p -value=0.087) (Figure 2), indicating that other factors also have driven the COVID-19 attributed mortality.

Discussion

Since most countries have now completed the first month since the beginning of the outbreak, the first conclusions can be drawn for the efficacy of the lockdown. It is clear, that East Asia countries did significantly better than Europe and North America since the beginning of this outbreak. A rapid adoption of quarantine measures as well as large-scale testing of the population contributed to this successful outcome.

In Europe, Greece was definitely one of the ‘success stories’, especially if we take into consideration that it had the lowest health expenditure in Europe and suffered significant shortages in the public health system as a result of the recent economic crisis (7-10). Another challenge that Greece had to face is the ‘explosive mixture’ of this epidemiological threat with the persistent refugee crisis that is evolving since 2014, with millions of migrants entering Europe *via* the Mediterranean (11, 12). This humanitarian (13) and social crises (14) generated challenges and struggles for the recovering Greek economy mostly in the field of healthcare and integration (11).

Despite being between a rock and a hard place as explained above, Greece was the country with the earliest adoption of the lockdown in response to COVID-19 outbreak, resulting in the lowest number of 30-day mortality per million population after Norway and Finland, which however had invested significantly

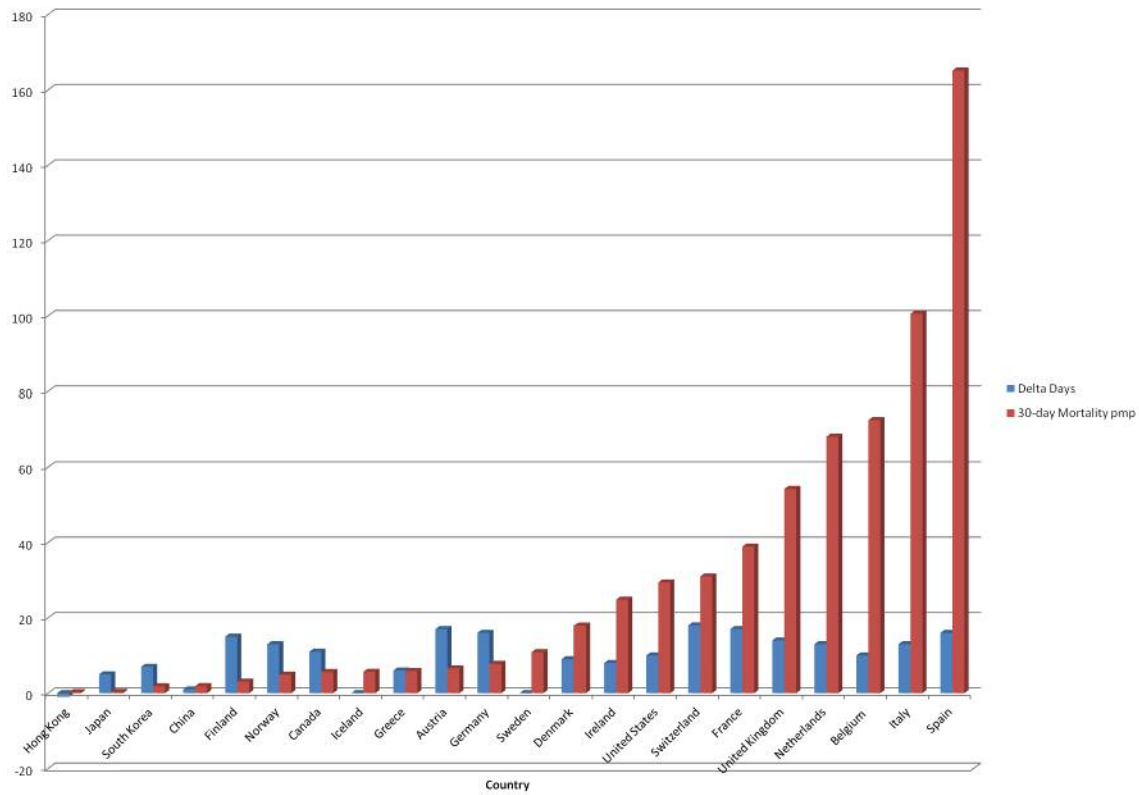


Figure 2. Delta days and 30-day mortality per million people per country.

Table I. Summary of the data used in this analysis.

Country	Date of 1 st case pmp	Quarantine starting date	GDP health expenditure (%)	Delta days	Total deaths in 30 days	Total cases in 30 days	Population (million)	30-day mortality pmp	30-day incidence pmp
Hong Kong	January 26, 2020	January 25, 2020	N/A	-1	2	85	7.45	0.27	11.41
Japan	February 22, 2020	February 27, 2020	10.93	5	42	1128	126.53	0.33	8.91
South Korea	February 19, 2020	February 26, 2020	7.34	7	94	8652	51.64	1.82	167.56
China	January 24, 2020	January 25, 2020	4.98	1	2592	77150	1,392.73	1.86	55.39
Finland	March 1, 2020	March 16, 2020	9.49	15	17	1418	5.52	3.08	256.98
Norway	February 28, 2020	March 12, 2020	10.5	13	26	4284	5.31	4.89	806.17
Canada	March 5, 2020	March 16, 2020	10.53	11	208	12375	37.06	5.61	333.94
Iceland	February 28, 2020	N/A	8.29	N/A	2	1020	0.35	5.67	2889.52
Greece	March 4, 2020	March 10, 2020	8.45	6.00	63	1613	10.73	5.87	150.36
Austria	February 28, 2020	March 16, 2020	10.44	17	58	7697	8.85	6.56	870.01
Germany	February 29, 2020	March 16, 2020	11.14	16	645	66885	82.93	7.78	806.54
Sweden	February 28, 2020	March 29, 2020	10.93	N/A	110	3700	10.12	10.87	365.61
Denmark	March 2, 2020	March 11, 2020	10.35	9	104	3107	5.80	17.94	535.93
Ireland	March 4, 2020	March 12, 2020	7.38	8	120	4273	4.84	24.82	883.76
United States	March 6, 2020	March 16, 2020	17.07	10	9616	336673	327.17	29.39	1029.05
Switzerland	February 27, 2020	March 16, 2020	12.25	18	264	14076	8.52	31.00	1652.78
France	February 28, 2020	March 16, 2020	11.54	17	2606	40174	66.99	38.90	599.73
United Kingdom	March 4, 2020	March 18, 2020	9.76	14	3605	38168	66.49	54.22	574.05
Netherlands	March 2, 2020	March 15, 2020	10.36	13	1173	13614	17.23	68.07	790.09
Belgium	March 2, 2020	March 12, 2020	10.04	10	828	13964	11.42	72.49	1222.55
Italy	February 22, 2020	March 4, 2020	8.94	13	6077	63927	60.43	100.56	1057.85
Spain	February 29, 2020	March 16, 2020	8.97	16	7716	87956	46.72	165.14	1882.47

GDP: Gross domestic product; pmp: per million population; N/A: not available.

in the development of their health system as demonstrated by the public health expenditure (15, 16). In contrast, other Southern Europe countries with similar statistics to Greece in terms of Gross Domestic Health Expenditure (15) and aging population (17), but with delayed adoption of quarantine, suffered the highest losses from the pandemic.

Our analysis has many limitations that deserve mentioning. We based our analysis on strict and widely accepted data without analyzing in depth the peculiarities and differences among nations and populations. The truth is that the Greek population is rather homogeneous compared to the diversity that can be found in other European countries or in the USA (18). Also, we did not discuss the differences in the economics of policies behind the implementation of the lockdown, since in many circumstances, the countries decided to follow less restrictive protection measures to prevent the financial impact and regression a general lockdown could cause to the local economy (19, 20). This decision might be financially justified but is not supported by data at the health and humanitarian level. Also, we did not assess the effect of lockdown on other aspects of social life, such as mental health (21), academic growth (22), education (23) and advanced healthcare services (24, 25). These are important factors that should be taken into consideration when evaluating outcomes of specific policies.

In conclusion, early lockdown was proven to be the appropriate policy to limit the spread of COVID-19. As more qualitative quarantine metrics, such as the different bundle of measures and restrictions and the level of population compliance per country become available, more conclusions regarding its role will be drawn. Together with the lack of reliable metrics to assess the capacity of health systems to respond to public health crisis, this might be the most important lesson from the current crisis.

Conflicts of Interest

The Authors have no conflicts of interest to declare in relation to this study.

Authors' Contributions

Dimitrios Moris performed the literature search and wrote the manuscript. Dimitrios Schizas revised the manuscript.

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