High impositions and stringent measures of countries to cope with COVID-19 reduce economic performance and do not lessen final fatality rate

Mario Coccia (✉ mario.coccia@cnr.it)

National Research Council of Italy

Research Article

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Abstract

The goal of this study is to develop a comparative analysis between countries having introduced a high or low level of restrictions and control measures in society to cope with Coronavirus Disease 2019 (COVID-19) pandemic crisis to assess if a policy response based on many pervasive compulsory measures is more effective to support a reduction of negative impact of COVID-19 on health of people and socioeconomic systems. In particular, the idea here is to analyze if countries with high restrictions and mandatory measures have lower fatality rates of COVID-19 and better economic performances than countries having policy responses based on little restrictions.

The results of this analysis here seem to be that:

Ž a strict policy of many restrictions and obligations does not reduce negative effects of COVID-19 pandemic in society in terms of lower mortality per 1,000 people and a lower-case fatality rate than countries with little restrictions (findings here show 1.19 vs. 0.89 and 0.82% vs. 0.43%, for countries with high and low restrictions respectively)

Ž countries with high restrictions and obligations reduce the economic performance in terms of lower average growth of quarterly Gross Domestic Product than countries with little restrictions (0.14% vs. 0.38%, for countries with high and low restrictions respectively).

This result can be explained with the fact that harsh containment policies are not a sufficient strategy to reduce the negative impact of new coronavirus in society, because there are manifold factors that support the diffusion of the novel coronavirus and mortality of COVID-19. Many countries applied hard and pervasive restrictions with the objective to reduce pandemic diffusion and support economic growth, but the evidence of this study shows that it is not a policy having effectiveness. These results can provide main information to extend knowledge in these topics to improve the crisis management and design best practices and effective policy responses to cope with COVID-19 and similar pandemic crisis.

Introduction

We are still in the throes of the pandemic of Coronavirus Disease 2019 (COVID-19), an infectious illness generated by new Severe Acute Respiratory Syndrome Coronavirus 2/SARS-CoV-2 (Bontempi et al., 2021; Bontempi and Coccia, 2021; Coccia, 2020, 2020a, 2020b, 2021; Johns Hopkins Center for System Science and Engineering, 2022; Vinceti et al., 2021). One of the fundamental problems to cope with pandemic crisis is the design and implementation of appropriate policy responses to reduce negative effects on health of people, healthcare sector and overall socioeconomic systems^[1]. Nicoll and Coulombier (2009, p. 3ff) argue that health policies to cope with pandemic can be: a) Mitigation interventions are based mainly on nonpharmaceutical measures, such as social distancing, school closures, etc. with the aim to reduce transmission dynamics and social pressure on hospitals and healthcare sector (cf., Moore et al., 2021); b) Containment measures have the goal to interrupt transmission dynamics by efficient contact tracing (e.g., contact tracing apps on smartphone), quarantine and general lockdown, appropriate treatments with vaccines and vaccine certificates to circulate, etc. Countries can apply these policy responses with two main approaches: a) implementing high restrictions and strict containment policies, such as a long period of full lockdowns, vaccine certificates and other compulsory measures of control in society; b) introducing low restrictions based on mitigation policies of short period and little compulsory measures to respect the individual freedoms. The restrictions of countries can be measured with some indices, such as the stringency index (Stringency Index, 2022). This measure simply records restrictions and the strictness of government policies, but it does not provide information about the appropriateness of a country's response to reduce the negative effects of pandemic crisis in society. In particular, it is unknown if a higher score of the stringency index (or similar one) implies a better country's response than others lower

on the index to cope with COVID-19 (Hale et al., 2021; Stringency Index, 2022). However, whether higher levels of restrictions in society lead to a national strategy and country's response having the best effectiveness to cope with COVID-19 is a critical problem in science for appropriate preparedness and crisis management to reduce negative effects of current and next pandemics similar to COVID-19. The goal of this study is to develop a comparative analysis between countries having introduced a high or low level of restrictions to cope with COVID-19 pandemic crisis to assess if a policy response based on high compulsory measures is more effective to support a reduction of negative impact of COVID-19 on health of people and socioeconomic systems.

In particular, the idea here is to analyze if countries with high restrictions and compulsory measures have lower fatality rates of COVID-19 and better economic performances than countries having policy responses based on little restrictions. These results can provide main information to extend knowledge in these topics to improve the crisis management and design best practices and effective policy responses to cope with COVID-19 and similar pandemic crisis (cf., Coccia, 2019g, 2021c, 2022a, 2022b, 2022c). This study is part of a large research project to explain drivers of transmission dynamics of COVID-19 and design effective policy responses to cope with and/or to prevent pandemic threats in society (Coccia, 2020, 2020a, 2020l, 2020m, 2021, 2022a).

Theoretical framework

Studies of sociology of COVID-19 endeavor to assess the impact of COVID-19 crisis and related policies on socioeconomic systems of countries (Coccia, 2022; 2022a, 2022b). In general, crisis management of COVID-19 pandemic is based on a multi-level governance, combining both national, regional and urban strategies to provide, whenever possible, timely policy responses and improve safety in society (Anttiroiko, 2021). Taherinezhad and Alinezhad (2022) propose a relational two-stage model with desirable-undesirable variables to measure the efficiency of nations to cope with pandemic and assess the efficiency of nations during the evolution of epidemic. Studies show that on average policy responses in Europe in 2020 tend to apply less stringent interventions than countries in East Asia (Ritchie et al., 2020). Anttiroiko (2021) analyzes how socioeconomic context, institutional arrangements, culture, and technology level can affect national responses to the pandemic in Eastern and Western countries. The study reveals that Asian countries applied policies with proactivity, whereas Western countries provide reactive policy responses against COVID-19 (cf., Coccia, 2021b, 2022a). Moreover, Anttiroiko (2021) highlights that Asian countries have applied with determination their policy responses to COVID-19 crisis in 2020 because of the early diffusion of pandemic that has supported learning processes and improved capabilities of crisis management. Instead, European countries have different culture, political systems and approaches to mitigate the negative impact of COVID-19 pandemic crisis on socioeconomic systems (Anttiroiko, 2021). Gupta et al. (2022) argue that nations to cope with the spread of COVID-19, they have imposed full lockdown that has negative effects on many sectors and overall economic system. In particular, manufacturing, agriculture, and the service sector have undergone a major slow down because of containment policies of lockdown that have disseminated negative effects on socioeconomic systems (cf., also Oshakbayev et al., 2022). Salisu et al. (2022) show that the negative impact of COVID-19 shock on real GDP is pervasive and more prevalent in the developed than emerging economies. Yao et al. (2022) analyze the factors that influence the COVID-19 pandemic in different countries. The findings suggest that countries with a higher democracy index have more deaths from COVID-19 in the initial phase of the pandemic, possibly due to low flexibility of governments and institutions to cope with unforeseen events with timely policy responses. Especially, Yao et al. (2022) show that the percentage of the population aged 65 years and above and health expenditure as a percentage of GDP were positively associated with countries' case fatality rates. This study suggests that the improvement of health

system with increased hospital beds and healthcare workforce per capita should reduce case fatality rate (cf., Coccia, 2021e). Han et al. (2022) maintain that climate variables, air pollution, and socioeconomic factors are associated with COVID-19 transmission and affect policy responses of countries (cf., Coccia, 2020a, 2020b, 2020c; Coccia, 2021, 2021a, 2021f). Buechler et al. (2022) show that stricter government restrictions and larger decreases in mobility (particularly retail and recreation) to cope with COVID-19 are most tightly linked to decreases in electricity consumption generating socioeconomic issues during the pandemic to manifold businesses. Pedauga et al. (2022) explore the sequence of reactions associated with shocks that arise from COVID-19 lockdowns. Findings reveal that a policy of lockdown generates different macroeconomic effects on sectors and firms. Full lockdowns negatively affect mainly small and medium enterprises because of larger reductions in demand. Kufel et al. (2022) argue that initially, to cope with COVID-19 pandemic, governments introduced national lockdowns, which have impacted both energy consumption and economies. Results for some European countries confirm a negative impact of these non-pharmaceutical interventions and containment policies both on energy consumption and on business cycle. The reduction of restrictions in subsequent pandemic waves increased electricity consumption, which suggests movement out of the economic recession. Kirson et al. (2022) propose a model (that does not account for the Delta and other variants and improvements in COVID-19 treatments) that suggests how COVID-19 vaccines can be substantial sources of gains to US GDP and lives saved for lower COVID-19 infections (cf., Gächter et al., 2022). Hence, COVID-19 pandemic crisis and the intensity of restriction policies of countries affect the dynamics of socioeconomic system such that Economic Outlook (2022) reveals that from October 2022 the prevision is a cut on global GDP growth forecast from 4.7% to 4.2%. One of the causes is the emergence of the Omicron variant that has lower damaging effects on health of people, but the disproportionate growth of global COVID-19 cases is inducing some countries to keep control measures and/or reduce restrictions slowly, feeding social insecurity, disruption of businesses and continuous constraints in economy. In this context, more and more important aspects in social sciences are the evaluation of the effectiveness of policy responses of countries to cope with pandemic crisis in terms of reduction of COVID-19 related deaths and support of the recovery of socioeconomic system. Next section presents a methodology to clarify these issues to extend knowledge in this fields of research and improve future policy responses of countries to contain and/or prevent negative effects of pandemics on public health and economy.

[1] Cf. also Coccia, 2020c, 2021a, 2021b, 2021c, 2021d, 2021e, 2021f, 2021g, 2022, 2022a, 2022b, 2022c.

Methods

Sample

The sample is based on 12 main countries: Australia, Denmark, Finland, France, Germany, Greece, Italy, New Zealand, Norway, Portugal, Sweden and the United Kingdom

Measures for statistical analyses

- Stringency index is based on a composite measure of nine response indicators given by: school closures; workplace closures; cancellation of public events; restrictions on public gatherings; closures of public transport; stay-at-home requirements; public information campaigns; restrictions on internal movements; international travel controls, etc. (cf., Appendix A). The index on any given day is calculated as the mean score of these nine metrics, each taking a value between 0 and 100. A higher score indicates a stricter response (i.e., 100 = strictest response). This index simply records the strictness of government policies, but it does not imply the appropriateness or effectiveness of a country's response to cope with COVID-19. A higher score does not necessarily mean that a

country's response is 'better' than others lower on the index to reduce negative effects of pandemic crisis in society (Hale et al., 2021; Stringency Index, 2022). Period January 2020 - January 2022.

- Quarterly gross domestic product total, percentage change, previous period, based on quarterly national accounts. Gross Domestic Product (GDP) is the standard measure of the value added created through the production of goods and services in a country during a certain period. It also measures the income earned from that production, or the total amount spent on final goods and services (less imports). While GDP is the single most important indicator to capture economic activity, it falls short of providing a suitable measure of people's material well-being for which alternative indicators may be more appropriate. This indicator is based on real GDP (also called GDP at constant prices or GDP in volume), i.e., the developments over time are adjusted for price changes. The numbers are also adjusted for seasonal influences. All the Organisation for Economic Co-operation and Development (OECD) countries compile their data according to the 2008 System of National Accounts. Sources: OECD Data (2022). Period 2020-2021: Q=Quarterly; 2020-Q1, 2020-Q2, 2020-Q3, 2020-Q4, 2021-Q1, 2021-Q2, 2021-Q3 and 2021-Q4
- Current health expenditure (% of GDP). Level of current health expenditure expressed as a percentage of GDP. Estimates of current health expenditures include healthcare goods and services consumed during each year. This indicator does not include capital health expenditures such as buildings, machinery, IT and stocks of vaccines for emergency or outbreaks. (The World Bank, 2022). Period 2008-2018 (last year available)
- Population total 2020. Total population is based on the de facto definition of population, which counts all residents regardless of legal status or citizenship. The values are midyear estimates. Source: The World Bank (2022a).
- Vaccination is measured by percent share of people fully vaccinated against COVID-19 on 11 February 2022. Data refer mainly to February 2022 but some countries, because of difficulty in the gather and transmission of information, can have data of January 2022. Of course, this small temporal gap of some countries does not affect the statistical analyses. The data here consider all types of COVID-19 vaccines used in different countries, such as vaccines by Johnson & Johnson, Oxford/AstraZeneca, Pfizer/BioNTech, Moderna, etc. (Coccia, 2022c; Mayo Clinic, 2021; Ritchie et al., 2020). Of course, every country is using a different combination of these COVID-19 vaccines to protect the population against COVID-19 and its variants. Source: Our World in Data (2022).
- COVID-19 deaths. Total number of deaths in February 2022. It indicates the severity of this new infectious disease in society. Source of data: Johns Hopkins Center for System Science and Engineering (2022).
- Fatality rate. Case Fatality Ratio % (on 11 February 2022). It indicates the severity of an infectious disease and evaluates the quality of health systems (Coccia, 2021e; Lau et al., 2021; WHO, 2020; Wilson et al., 2020). Case Fatality Ratio (CFR) estimates the proportion of deaths among identified confirmed cases of COVID-19 and it is given by:

$$\text{Case Fatality Ratio (CFR) \%} = \left(\frac{\text{Number of deaths from COVID-19}}{\text{Number of confirmed cases of COVID-19}} \right) \times 100$$

Angelopoulos et al. (2020) maintain that Case Fatality Ratios (CFRs) between countries are critical measures of relative risk that guide policymakers to decide how to allocate medical resource to cope with COVID-19 pandemic crisis. This study also calculates the mortality rate per 1000 people for a comparative analysis with CFRs to assess with accuracy the effects of policy responses of countries.

$$\text{Mortality rate per 1000 people} = \left(\frac{\text{Total number of deaths from COVID-19 at February 2022}}{\text{Total population in 2020}} \right) \times 1000$$

Source of data: Johns Hopkins Center for System Science and Engineering (2022).

Data analysis procedure

Firstly, the Stringency Index (2022) of the countries under study is used to categorize them in two sets:

- Group 1: Countries with a high level of restrictions and mandatory measures of control (measured with Stringency Index having an average value of about 63; 100 =strictest),such as Australia, France, Germany, Greece, Italy and Portugal.
- Group 2: Countries with a low level of restrictions and obligations in society to cope with COVID-19 (Stringency Index has an average value of 49): Denmark, Finland, New Zealand, Norway, Sweden and the United Kingdom.

Secondly, descriptive statistics given by arithmetic mean and standard error of the mean of variables (Quarterly GDP- Percentage change, Health expenditure % of GDP; Fully vaccinated people; Case Fatality Ratio % and Mortality per 1,000 people) is calculated for just mentioned two groups. Results show a preliminary comparative analysis of the effectiveness of countries policy responses based on a higher /lower score of the strictness of government policies on socioeconomic systems (Coccia, 2018; Coccia and Benati, 2018a).

Thirdly, follow-up investigation on 12 countries is performed with bivariate Pearson correlation and partial correlation (controlling health expenditure as % of GDP) to assess the sample correlation coefficient, r , which measures the strength and direction of linear relationships between pairs of continuous variables under study. The strength can be assessed by these general guidelines:

$0.1 < |r| < 0.3$... small / weak correlation

$0.3 < |r| < 0.5$... medium / moderate correlation

$0.5 < |r|$ large / strong correlation

After that, the study performs the Independent Samples t -Test that compares the means of two independent groups to determine whether there is statistical evidence that the associated population means are significantly different. The assumption of homogeneity of variance in the Independent Samples t Test – i.e., both groups have the same variance – is verified with Levene's Test based on following statistical hypotheses:

$H_0: \sigma_1^2 - \sigma_2^2 = 0$ (population variances of group 1 and 2 are equal)

$H_1: \sigma_1^2 - \sigma_2^2 \neq 0$ (population variances of group 1 and 2 are not equal)

The rejection of the null hypothesis in Levene's Test suggests that variances of the two groups are not equal: i.e., the assumption of homogeneity of variances is violated. If Levene's test indicates that variances are equal between the two groups (i.e., p -value large), equal variances are assumed. If Levene's test indicates that the variances are not equal between the two groups (i.e., p -value small), the assumption is that equal variances are not assumed. After that, null hypothesis (H'_0) and alternative hypothesis (H'_1) of the Independent Samples t -Test are:

H'_0 : $\mu_1 = \mu_2$, the two-population means are equal in countries having high and low restrictions.

H'_1 : $\mu_1 \neq \mu_2$, the two-population means are not equal in countries having high and low restrictions.

Statistical analyses are performed with the Statistics Software SPSSâ version 26.

Findings

The arithmetic mean (M) of the stringency index of countries under study generates the following categorization of countries in two groups for a comparative analysis:

- *Countries with a High level of restrictions and compulsory measures of control*, average stringency index over 2020-2022 (January) period = 62.97 (Std. Error .279)
- *Countries with a Low level of restrictions and compulsory measures of control*, average stringency index over 2020-2022 (January) period=49.01 (Std. Error .282)

[Table 1 is in the supplementary files section.]

Table 1 shows that countries with high restrictions and obligations in society (average stringency index of 62.97) have mortality per 1000 people and fatality rate (%) higher than countries with low restrictions and mandatory measures: 1.19 vs. 0.89 and 0.82 vs. 0.43, respectively. In addition, average quarterly GDP of countries with a high score of stringency index (high restrictions) is +0.14, 64% lower than countries with a low score of stringency index and low restrictions (that is +0.37). This finding reveals how compulsory measures block the operation of socioeconomic systems without reducing negative effects of COVID-19 pandemic crisis in society. Comparative analysis of these two groups of countries also shows that average health expenditure (% of GDP) is almost similar, whereas share of people vaccinated is higher, of course, in countries with high restrictions and compulsory measures that in some countries have been forces with immunity passports on work and vaccinations mandatory for adults that reduce individual freedoms generating a flawed democracy.

Figure 1 shows, *ictu oculi*, how countries with a high level of restrictions and compulsory measures have a deterioration of economic systems and a higher negative impact of pandemic in society. This result can be explained with the fact that restrictions and mandatory measures of control to cope with COVID-19 are not a sufficient strategy to reduce the negative impact of the novel coronavirus in society, because there are manifold factors that support the diffusion and mortality of this pandemic, also in countries having a high level of fully vaccinated people associate with high restrictions.

Pearson Correlation	Average Stringency Index 2020-2022	Average GDP Growth Q 2020-2021	Fatality Rate 11 Feb 2022	Total Mortality per 1000, 11 Feb 2022	Full Vaccinated people 11 Feb 2022
Average Stringency Index 2020-2022	1	-0.279	.795**	.543*	0.003

** Correlation is significant at the 0.01 level (1-tailed).

* Correlation is significant at the 0.05 level (1-tailed).

Table 2 shows a high positive correlation in sample between stringency index and fatality rate ($r=.80$, p -value .01) and total mortality ($r=.54$, p -value .05). These results are confirmed with partial correlation controlling average health expenditure (Table 3).

Table 3. Partial Correlation

	Pearson Correlation	Average Stringency Index 2020-2022	Average GDP Growth Q 2020-2021	Fatality Rate 11 Feb 2022	Total Mortality per 1000, 11 Feb 2022	Full Vaccinated people 11 Feb 2022
Age Health expenditure 8-2018	Average Stringency Index 2020/2022	1	-0.262	0.796	0.614	-0.005
	Significance (1-tailed)		0.218	0.002	0.022	0.494

Table 4. Independent Samples Test of countries with high vs. low restrictions.

		Levene's Test for equality of variances		t-test for equality of Means				
		<i>F</i>	Sig.	<i>t</i>	df	Sig. 2-tailed	Mean Difference	Std. Error Difference
Average GDP growth Q 20-2021	Equal variances assumed	5.758	0.037	-1.152	10	0.276	-1.383	1.201
	Equal variances not assumed			-1.152	5.01	0.301	-1.383	1.201
Mortality Rate, Feb 2022	Equal variances assumed	0.8	0.392	1.893	10	0.088	0.388	0.205
	Equal variances not assumed			1.893	9.074	0.091	0.388	0.205
Daily Mortality per 10, 11 Feb 2022	Equal variances assumed	0.069	0.798	0.91	10	0.384	0.497	0.546
	Equal variances not assumed			0.91	9.939	0.384	0.497	0.546
Total Vaccinated people, 11 Feb 2022	Equal variances assumed	1.489	0.25	0.77	10	0.459	2.567	3.334
	Equal variances not assumed			0.77	7.222	0.466	2.567	3.334

Independent Samples Test in table 4 suggests a similar arithmetic mean across countries with high and low restrictions (retain null hypothesis). This result may be due to small sample that reduces the consistency of this statistical analysis. However, in general, the statistical evidence above seems in general to support the hypothesis that high level of restrictions and obligations in society does not improve the management of COVID-19 pandemic compared to countries with little restrictions in terms of reduction of mortality and better functioning of economic system that shows a low average rate of quarterly growth (2020-2021 period) than countries having little compulsory measures.

Discussion

The critical findings of this study are that a strong policy of restrictions and obligations does not reduce negative effects of COVID-19 pandemic in society, whereas it seems to reduce the economic performance of countries in terms of low quarterly growth of GDP (average value over 2020-2021 period). This result can be explained with the fact that hard containment policies are not a sufficient strategy to reduce the negative impact of new coronavirus in society, because there are manifold factors that support the diffusion of the novel coronavirus and mortality of COVID-19. Many countries applied harsh and pervasive restrictions with the objective to reduce pandemic diffusion and support economic growth, but the evidence of this study shows that it is not a policy having effectiveness. Libman (2018) argues that governmental economic policy is one of the major factors influencing economic growth. However, the containment of COVID-19 pandemic crisis and growth performance depend not only on what policy measures the government decides to implement but also on how these policies are implemented such that inefficient regulatory measures can undermine also the most reasonable policy measures. Ball (2021) argues that Sweden adopted a more relaxed strategy that avoided lockdowns and people were treated with trust and openness about the measures being adopted. Initially, results suggested in 2020 that Sweden had much higher fatalities than surrounding countries

(Ball, 2021), but in 2022 results in terms of low mortality related to COVID-19 and high economic growth of Sweden are better than other countries applying stringent measures of containment (Johns Hopkins Center for System Science and Engineering, 2022; Stringency Index 2022). The UK has also applied low restrictions to reduce the risk that strict policy responses would be unpopular and in 2022 economic performance is better and negative impact of COVID-19 is similar or lower than countries with more restrictions (Birch, 2021). Studies suggest that countries with manifold restrictions and obligations tend to generate complex and ambiguous rules, also because they are constantly changing with pandemic evolution, generating increasing confusion and social insecurity that damage people, organizations and overall socioeconomic systems (Gore, 1994). A prominent lesson to be learnt from the COVID-19 pandemic experience is how scientific advice feeds into political decision-making, and if it is based on the value of independence and transparency of that advice. In many countries, contradictory scientific recommendations have created confusion because many initial claims were subsequently proved to be false or misleading. Ball (2021, p. 9) argues that policy responses to cope with COVID-19 should be based on some requirements, such as:

- To establish credibility and generate trust
- Trust can only be generated by openness
- Openness requires recognition of uncertainty, where it exists
- The importance of precautionary measures should not be played down on the grounds that the risk is unproved
- The public should be trusted to respond rationally to openness
- Scientific investigation of risk should be open and transparent
- The advice and the reasoning of advisory committees should be made public

However, many of these tenets was disregarded during the COVID-19 pandemic by countries applying a lot of restrictions with ambiguity and inconsistency and delayed containment rules with the temporal evolution of pandemic, generating a low effectiveness to reduce negative effects in society (Coccia, 2021, 2022b). The COVID-19 pandemic shows how the effectiveness of scientific and technological interventions to support public policy is based on manifold social and institutional factors (Raleigh, 2020). In fact, policy responses of restrictions cannot be fully effective if people cannot afford to adhere to them (Green et al., 2021). Effective response policies also depend on clear and honest communication, and an ability to overcome aspects of misinformation for compliance with restrictions (Ball, 2021). In general, efficient governance can support health system preparedness in the presence of turbulent scenarios given by pandemic crisis and new population needs. Moreover, countries with constant investment in health sector and preparedness can reduce mortality, morbidity and stress among the population as well as promote public health and economic recovery after pandemic crisis (Kluge et al., 2020; Coccia, 2021b). Kapitsinis (2020) argues that investments in health sector are a critical public policy to mitigate mortality rate of COVID-19 and future pandemics. Hence, countries should support healthcare investments in the expansion of hospital capacity and R&D investments in new technology to develop effective vaccines, antivirals, innovative drugs and high-tech devices that can counteract future public health threats of new epidemics like COVID-19 (Ardito et al., 2021; Coccia, 2017c, 2017d, 2019f, 2020) ^[1]. Sagan et al. (2020) argue that effective governance is a critical factor to a resilient response in the presence of crisis. Instead, bureaucratic rules directed to a high degree of control and restrictions over public and private life reduce individual liberties of people generating social, psychological and economic issues without reducing negative effect of pandemic in society (Chantler et al., 2019; Cornell et al., 2020; Dye and Mills, 2021; Phelan, 2020).

Brown et al. (2021) suggest that the implementation of immunity passports, a main measure of restriction applied in many European countries, ought to be applied to maximize their benefit without reducing wellbeing of people. Kamin-Friedman and Peled Raz (2021) argue that green pass: “imposes restrictions on the movement of individuals who had not been vaccinated or who had not recovered, it is not consonant with solidarity and trust building. Implementing the Green Pass provision while advancing its effectiveness on the one hand, and safeguarding equality, proportionality, and fairness on the other hand may imbue this measure with ethical legitimacy despite involving a potential breach of trust and solidarity”. Saban et al. (2021) maintain that policymakers should use a balanced approach to protect public health, with minimum infringement on citizens' rights. Luster et al. (2021) maintain that: “the Green Pass policy raises practical, legal and ethical concerns.... any privileges or restrictions guided by one's COVID-19 immunization status must be designed with the utmost attention to prevent a disproportionate violation of the human rights of the non-vaccinated and the public at large”.

Overall then, restriction policies and compulsory measures are originated to cope with pandemic and support economic recovery, but some countries in Europe are using obligations to penalize people (such as without vaccination), reducing individual freedoms, increasing the discrimination between people in social, cultural and sporting activities, inducing tensions between different social groups, and as a consequence reducing perspective for sustaining economic growth (Kosciejew et al., 2021; Waitzberg et al., 2021; Wilf-Miron et al., 2021). Gore (2004) argues that in contexts of uncertainty, governments tend to create administration's policies with inconsistencies, ambiguities and little transparency to reduce accountability to the people and the public interest (cf., Wilf-Miron et al., 2021). Moreover, a persistent use of restriction policies, leveraging potential health risks, can lead to authoritarian rules that reduce individual freedoms and create socioeconomic problems, with low benefits to cope with COVID-19 pandemic (Wesołowski, 1990) [2]. In general, Ball (2021) argues that the diversity of pandemic outcomes and responses throughout the world makes it hard to draw any general conclusions about how science, policy and society can and should interact (cf., Shattock et al., 2022). Ball (2021, p. 9) also maintains that: "Politicians, ..., should not use science as a shield against making (or accepting responsibility for) difficult decisions, and should acknowledge that scientific advice is likely to be more effective when it is genuinely independent, autonomous and transparent. We cannot expect good public health to be valued and nurtured if political health is poor".

[1] For role of science, technology, research labs, leading firms and institutions for economic and social change see: Ardito et al., 2021; Coccia, 2003, 2005, 2005a; Coccia, 2008, 2013, 2014, 2015, 2016, 2107, 2017a, 2017b, 2017c, 2017d, 2017e, 2018a, 2018b, 2018c, 2018d, 2018e, 2018f; Coccia, 2019, 2019a, 2019b, 2019c, 2019d, 2019e, 2019f; 2019g, 2019h, 2019i, 2019l, Coccia, 2020d, 2020e, 2020f, 2020g, 2020h, 2020i; Coccia, 2021h, 2021i, 2020l, 2020m; Coccia, 2022d; Coccia and Bellitto, 2018; Coccia and Benati, 2018; Coccia and Cadario, 2014; Coccia and Finardi, 2012, 2013; Coccia and Rolfo, 2000, 2008; Coccia and Watts, 2020; Coccia and Wang, 2015, 2016; Pagliaro and Coccia, 2021; Pronti and Coccia, 2020.

[2] Wesołowski (1990) argues some axioms of the authoritarian regime, such as the state's power (state) is the fundamental mechanism of social integration and regulation; the state is an organism which stands above all other forms of social organization and exerts control over them; it uses violence when needed, etc.

Conclusions

In the presence of a continuous global COVID-19 pandemic threat, one of the goals of nations is to mitigate mortality and support economic growth (cf., Coccia, 2020a, 2021e).

The results of this analysis here seem to be that:

- a strict policy of many restrictions and obligations does not reduce negative effects of COVID-19 pandemic in society in terms of lower mortality per 1,000 people and a lower-case fatality rate than countries with little restrictions (findings here show 1.19 vs. 0.89 and 0.82% vs. 0.43%, for countries with high and low restrictions respectively)
- countries with high restrictions and obligations reduce the economic performance in terms of lower average growth of quarterly Gross Domestic Product than countries with little restrictions (0.14% vs. 0.38%, for countries with high and low restrictions respectively).

Although this study has provided interesting results, that are of course tentative, it has several limitations. First, a limitation of the study is the lack of data in manifold countries. Second, not all the possible confounding factors that affect the policy responses and mortality of COVID-19 are taken into consideration and in future studies these factors deserve to be controlled for supporting results here. Third, the lack of integration of data with socioeconomic aspects of countries may influence the results of mortality and economic growth, making comparative analyses a problematic approach (Angelopoulos et al., 2020; Coccia, 2018). Fourth, country-specific health investments may affect response policies of countries and have to be controlled in future development of this study. Thus, the generalization of this results should be done with caution.

Future research should consider new data and countries and to examine also other variables between countries to explain the interaction between policy responses, mortality and other socioeconomic factors. Hence, there is need for much more detailed research in these topics and this study encourages further investigations to clarify complex factors to design appropriate strategies cope with pandemic threat without damaging socioeconomic system. Results here have to be reinforced with much more follow-up investigation concerning a large sample of countries for detailed research into the relations between response policies, effects of pandemic in health of people and socioeconomic system.

Overall, therefore, the increase in mandatory measures may have little effectiveness in addressing the negative effects of the pandemic crisis and improving economic performance, also decreasing the individual freedoms that generate some abuses in democratic countries because of informally authoritarian rules applied in circumstances of social precariousness, fueling the fear of the pandemic in society. To conclude, it is worth raising the question whether in the presence of pandemic crisis, the uncontrolled implementation of health policies based on high restrictions and authoritarian rules by political authorities can generate more hazardous effects in society than new viral agents, restrictions that do not reduce negative the effects of COVID-19 pandemic in society, do not improve economic growth and direct nations towards a flawed democracy with socioeconomic issues of long run.

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Tables

Table 1 is in the supplementary files section.

Figures

Figure 1

Supplementary Files

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