MICROBE

Co-funded by the Erasmus+ Programme of the European Union

Minimizing the influence of coronavirus in a built environment

MICROBE

CORRELATION-REGRESSION ANALYSIS, MULTI-CRITERIA CALCULATIONS, COVID-19 MODELS, REGRESSION EQUATION FOR PREDICTING COVID (INCIDENCE AND DEATH)

Project No: 2020-1-LT01-KA203-078100

Contents

1. Introduction

Developed and developing countries can learn a great deal from one another in their struggles with COVID-19 (Anttiroiko, 2021). For example, key reason points to East Asian people who adapted wearing masks and social distancing as standards of collective measures to ensure their entire community's safety together (Liu et al., 2020). However, developing countries are likely to suffer heavier economic and human costs, because they generally have poorer governance, larger informal sectors, lower health care capacity, shallower financial markets and less fiscal space (Loayza and Pennings, 2020). Likely impacts from the COVID-19 pandemic include increased extreme poverty rates in developing countries (World Bank, 2020) as well as aggravated political and social divisions and higher inequality (Furceri et al., 2020). Scientists (Roper, 2020; Schell et al., 2020; Brauner et al., 2021) have analyzed the dynamic effects of the environment pertinent to the economy, culture, ecology, population density, health systems, local and state regulations and others regarding the scope of the pandemic. The revocation of people's rights by the implementation of social restrictions, including lockdowns, intended to slow the pandemic, have never been instituted in liberal democracies (Grogan, 2020). Social restrictions did demonstrate their effectiveness; however, unfortunately, mental health suffered throughout populations (Brülhart et al., 2021). Studies (Van Dorn et al., 2020; Wade, 2020; Ahmed, 2020) also investigated why the infection and mortality rates from COVID-19 are disproportionately high in communities of color in cities of the United States and United Kingdom. The proposal raised upon consideration of the existing situation was to analyze alternative strategies and tactics for lessening the effects of COVID-19 (Bedford et al., 2020; Cohen and Kupferschmidt, 2020; Stockmaier et al., 2021).

The systemic analysis conducted for this research covered documents and scholarly literature from international institutions and intergovernmental organizations published during the COVID-19 period and up to one century earlier that included the Spanish Flu and HIV/AIDS pandemics. The studies involved had analyzed interdependencies influencing pandemic spreads and relevant country cultures. Interrelationships between country successes, sustainability and COVID-19 indicators of different countries were also investigated. Some systemic reviews and meta-analyses designated for describing such research were also discovered. However, no studies were found that attempted to summarize the impact of country success across the scope of COVID-19 cumulative cases and excess deaths. The studies conducted and developed the CSC Map models here validated worldwide research results claiming interdependencies between the policy responses to COVID-19 enacted by countries and the indicators of a respective country's success and sustainability.

In this report, we analyzed alternative cross-cultural theories, the spread of the pandemic, culture, and links between them and interrelationships between country success, sustainability, and COVID-19 indicators. This interdisciplinary research integrates various domains into one study. It incorporates knowledge from numerous interconnected fields like medicine, society, culture, economy, politics and the environment. All of these fields, which are deliberated in this article in an integrated manner, innovatively enlarge the Big Picture of COVID-19 pandemic on a global scale. This health policy research involved the development of Country Successes and a COVID-19 (CSC) Maps of the World. The map along with statistical calculations and CSC Map Models serve as the basis for establishing conclusions. We suggest policy recommendations to improve the micro, meso, and macro-level environment during and post the COVID-19 period.

2. A Comparison of 169 countries' successes and priorities calculated by 8 and 15 criteria

In the endeavor to validate second hypothesis, the calculations pertinent to the comparison of the successes and priorities of 169 countries were based on 8 and 15 criteria. Upon comparing the calculations pertinent to the success of 169 countries (CS) by 8 criteria (CS_8) and by 15 criteria ($CS1_5$), the average absolute deviance established was 4.97%. The difference established between CS_8 and $CS1_5$ does not exceed 5% for 111 of 169 countries, or 66.5% of them. The difference in the success of the remaining 33.5% of the countries is greater than 5%. However, it does not exceed 12.3% which is indicated by the high degree of overlap between CS_8 and $CS1_5$ (figure 1).

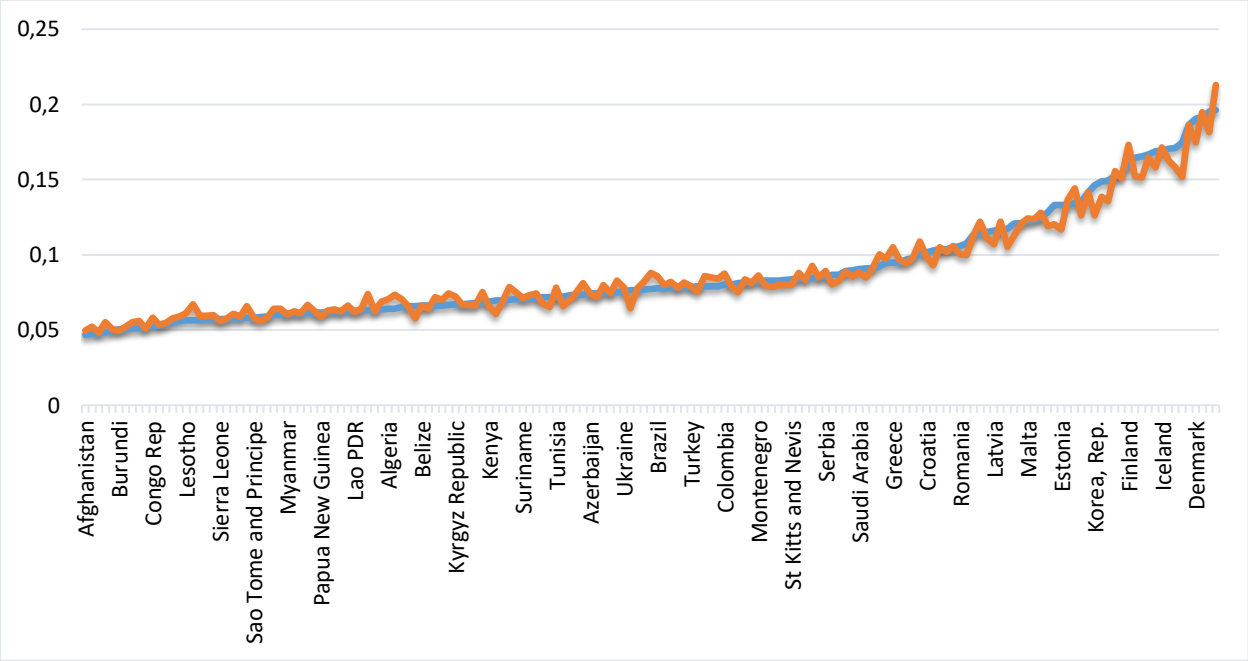


Figure 1. Country success comparison of 169 countries (calculated by 8 and 15 criteria)
- Country success calculated by 15 criteria ($CS1_5$) for 169 countries
- Country success calculated by 8 criteria (CS_8) for 169 countries

It is noticeable that the values of country success priorities calculated according to 8 criteria (CSP_8) are not very far from the values of country success priorities calculated according to 15 criteria (CSP_{15}). The deviation between the CSP_8 and CSP_8 values is 4.81%. It was also established that the difference between the values of CSP_8 and CSP_{15} was less than 5% in 129 of 169 countries or in 77.2% of them. The difference was greater than 5%, albeit less than 15% for all the other countries, which indicates a sufficiently high correspondence between the values of CSP_8 and CSP_8 (figure 2).

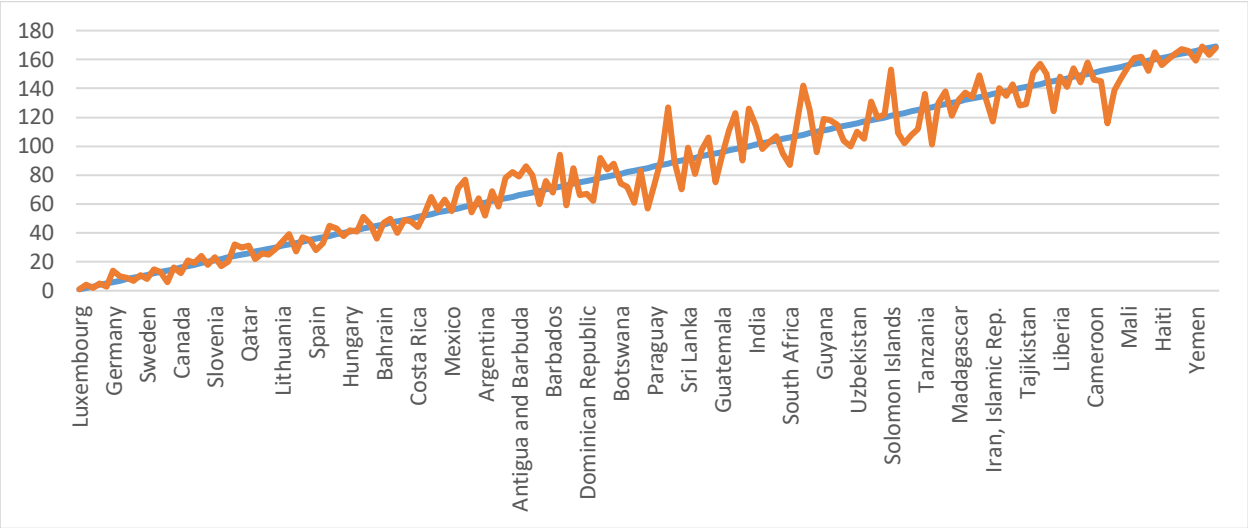


Figure 2. Priority comparison of 169 country successes (calculated by 8 and 15 criteria)

- Country success priorities calculated by 15 criteria (CSP_{15}) for 169 countries

- Country success priorities calculated by 8 criteria (CSP_{8}) for 169 countries

3. CSC Map Models

CSC Map Models evaluate the relationships between a dependent variable (country success or cumulative cases and excess deaths per 100,000 population) and 15 independent variables (the country success and sustainability indicators). CSC Map Models formally represents the CSC Map.

The 169-country CSC Map Model suggests that a 1% increase in the values of GDP per capita, human development index, global gender gap, environmental performance index and democracy index causes increases in cumulative cases per 100,000 population, correspondingly, by 0.38, 3.45, 3.57, 2.15 and 1.25 percent. According to the 78-country CSC Map Model, a 1% increase in the values of GDP per capita, the human development index, global gender gap, environmental performance index and democracy index causes decreases in excess deaths per 100,000 population, correspondingly, by 0.52, 3.79, 1.76, 1.32 and 1.03 percent.

The countries under deliberation were divided up into a control group and an experimental group. The control group consisted of 77 countries corresponding to the countries employed by the 2020 Inglehart–Welzel Cultural Map of the World. The experimental group consisting of 64 countries was not analyzed by this map. The basis of these analyses of 64 and then, 77 countries was the 15 criteria system (V_1-V_{15}). The countries are distributed across the CSC Map according to the values found on the X-axis (country success) and the Y-axis (COVID-19 indicators).

We applied the linear multivariable regression method to determine the influence of the selected criteria on the dispersion of the independent variables.

It was established that GDP per capita explains 80% of the dispersion of the 77 countries' success variable. Thus, the conclusion can be drawn that economic factors have the greatest influence on the dissemination of the success variable of 77 countries. This was not surprising, since various investigations indicate a huge continuum of influence from the GDP indicator. Considerable inertia is characteristic of gradually changing variables, such as socioeconomic development. At any point the stocks accumulated so far are always much greater than the gains achieved, or losses incurred in one year. GDP added in a year is always just a small percentage of the entire GDP of a country. Substantial changes in gradually changing, or cumulating, variables like these only become visible in the long run (Inglehart and Welzel, 2005). GDP per capita along with an economic growth forecast explain 81.2% of the dispersion of the country success variable. The fragile state index variable separately explains 72.1% of the dispersion of the country success variable, on its own

accord. It was established, during the course of the study, that the compiled model is suitable for deliberation (p<.05). Meanwhile all the variables used in the model explain 95.5% of the dispersion of the country success variable. The following is an analytical expression of the compiled model:

$$V_{CS} = .164 + .001 \cdot V01 + .0003 \cdot V02 + .00003 \cdot V03 + .0004 \cdot V04 - .054 \cdot V05 + .031 \cdot V06 - .003 \cdot V07 + .001 \cdot \ \cdot V08 - .002 \cdot V09 - .0002 \cdot V10 + .002 \cdot V11 - .001 \cdot V12 + .002 \cdot V13 - .0003 \cdot V14 - .004 \cdot V15 \quad (1)$$

The conclusion drawn upon completing the analysis of the model is that the greatest influence on the success variable of 77 countries comes from GDP per capita, the corruption perceptions index, the unemployment rate, and the fragile state index. This means that the variables in the system influencing country success consist of the macroeconomic, environmental, political, human development and well-being, values-based and quality of life criteria.

Although GDP per capita explains the country success variable quite suitably, in this case, it only explains 17.2% of the cumulative cases per 100,000 population (V_{17}) variable in the dispersion of 77 countries. Additional variables are needed when aiming to increase the explanatory power of the regression model. One such variable is freedom and control, which, separate from the rest, explains 34.2% of the dispersion in V_{17}. Of its own accord, though together with GDP per capita, freedom and control explains 35.2% of the dispersion in V_{17}. A conclusion can be drawn based on such regression analysis results that it is necessary to include more country success and sustainability indicators in the model being considered. This would permit increasing the explanatory power of the compiled model. By selecting the system containing macroeconomic, environmental, political, human development and well-being, values-based and quality of life criteria, and completing the regression analysis, it becomes possible to draw a conclusion that the model is suitable for deliberation (p<.05). Meanwhile, all the selected variables explain 63.2% of the dispersion of the cumulative cases per 100,000 population variable. The regression equation compiled based on the results of the regression analysis is the following:

$$V17 = -4434.8 - 31.247 \cdot V01 + 50.177 \cdot V02 + 7.459 \cdot V04 + 6300.053 \cdot V05 + 5172.697 \cdot V06 + 322.084 \cdot \cdot V07 + 92.314 \cdot V08 - 2229.705 \cdot V09 + 32.145 \cdot V10 - 1527.857 \cdot V11 + 77.965 \cdot V12 + 73.835 \cdot V13 + 112.949 \cdot \ \cdot V14 - 245.591 \cdot V15 \quad (2)$$

A significant influence on the dependent, cumulative cases per 100,000 population variable, in 77 countries comes from independent variables such as freedom and control, the democracy index and fragile state index. The other independent variables have some influence on the dependent, cumulative cases per 100,000 population variable, however, their influence is insignificant. Furthermore, it was established that the variables used for the seven separate country clusters applied on the CSC Map explain from 39.4% (for the West and South Asia region) to 76.3% (for the Protestant European region) of the dispersion of the cumulative cases per 100,000 population variable.

The model compiled on the success of 64 countries is suitable for deliberation (p<.05). Furthermore, it was established that all the variables in the model under analysis, which reflect the changes in the selected indicators, explain 97.2% of the dispersion of the country success variable. GDP per capita had the greatest influence on the country success variable. The changes in its value separately explain 73.5% of the dispersion of the country success variable. Additionally, the variable fragile state index has a significant influence on the country success variable. The changes in this variable explain 57.4% of the dispersion of the country success variable. Meanwhile the changes of

both these variables explain 76.6% of the dispersion of the country success variable. Separately, changes in the economic decline index variable explain 47.7% of the dispersion of the country success variable. A conclusion can be drawn that GDP per capita, the fragile state index, and economic decline index variables have the greatest influence on the country success variable for the 64 countries under analysis. Changes in the values of these variables explain 78.5% of the dispersion in the country success variable. The other variable used in the model also influences the country success variable. However, its influence is not as great as that of the aforementioned variables.

Upon examining the dependence of the cumulative cases per 100,000 population variable (V_{17}) on the country success and sustainability indicators that have been used to assess 64 countries, it was established that this model is suitable for analysis. Meanwhile the changes in the values of the applied indicators explain 64.8% of the dispersion pertinent to the V_{17} variable. The human development index variable has the greatest influence on the V_{17} variable in the model. Separately, it explains 35.8% of the dispersion of the V_{17} variable. Furthermore, the fragile state index variable also greatly influences the compiled model. Its changes explain 28.9% of the dispersion of variable V_{17}. Together these variables explain 36.6% of the V_{17} dispersion. Changes in the values of the economic decline index variable separately explain 23.9% of the variable V_{17} dispersion. Thus, a conclusion can be drawn that the human development index, fragile state index, and economic decline index variables have the greatest influence on the cumulative cases per 100,000 population variable (V_{17}). Together the changes under assessment explain 38.7% of the V_{17} dispersion.

Next, the variable excess deaths per 100,000 population dispersion was analysed against the 15-indicator CSC Map Model of 78 countries (table S1). The correlation analysis only used data on 84 countries pertinent to COVID-19 excess deaths per 100,000 population sourced from The Economist (2021a). The necessary 15 indicators under deliberation were not all available for 6 of the submitted 84 countries. Thus only 78 countries were deliberated for this study. A conclusion is possible following the analysis on the dependency of excess deaths per 100,000 population from the model of 15 selected variables pertinent to the model of 78 countries. The model of the CSC Map is statistically significant ($p<.05$). Meanwhile changes in the values of the selected 15 criteria, accordingly, explain 52.8% pertinent to the dispersion of the excess deaths variable.

Other researchers have also obtained similar results relevant to the use of different numbers of variables (Inglehart and Welzel, 2005; Inglehart, 1997). The correlation is high between the factor scores from the 10 items under this analysis and the factor scores that are based on 22 items (Inglehart, 1997). The five items applied for this study as a basis pertinent to the traditional dimension versus the secular-rational dimension correlate nearly entirely with the factor scores from the dimension under comparison based on 11 variables ($r = .95$). Additionally, the survival versus self-expression dimension based on five variables also correlates nearly entirely with the survival versus self-expression dimension based on 11 variables ($r = .96$). These robust dimensions reflect a pool of many more items. There were technical reasons for applying five indicators to tap each dimension for a total of ten indicators that appear here (Inglehart and Welzel, 2005).

Second hypothesis is verified by this method that there is an interrelationship between the indicators from system of criteria, which thoroughly describe a country's success and sustainability. Additionally, as the numbers of countries and their indicators change, the conditional successes of countries remain quite similar.

4. Country Success and the COVID-19 Maps of the World

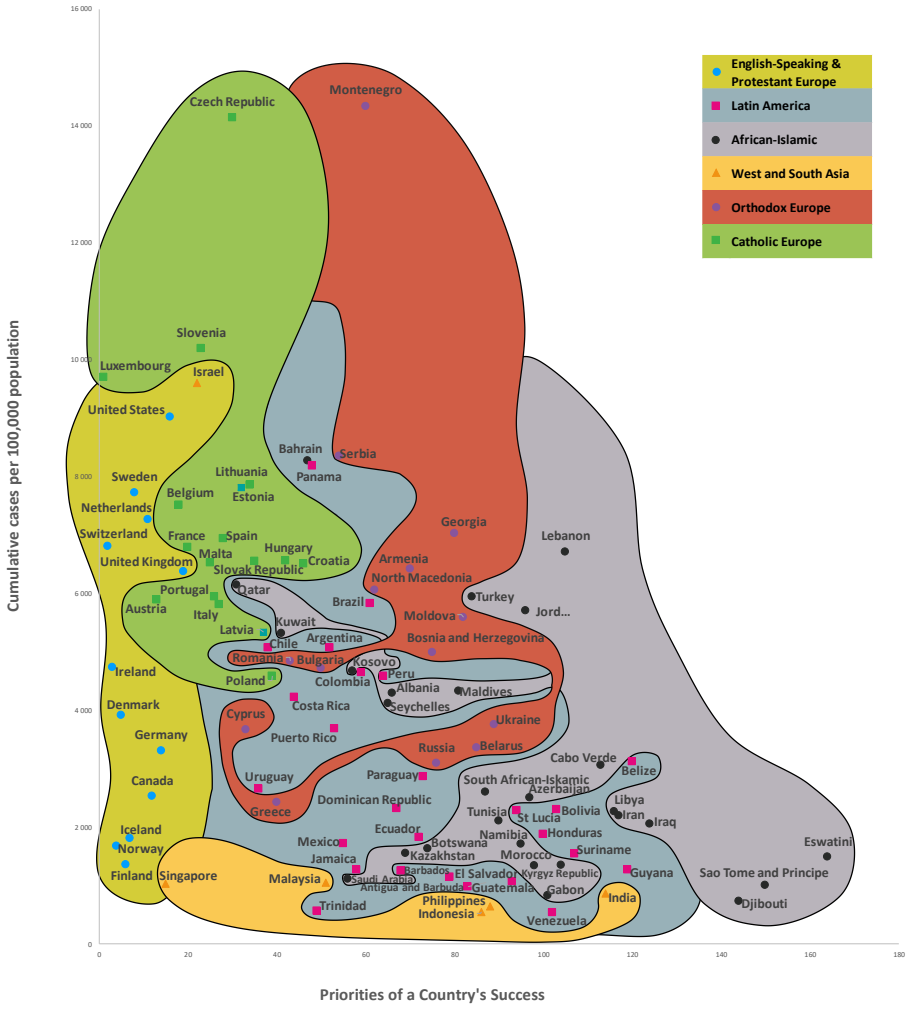
The development of Country Successes and COVID-19 Maps of the World (CSC Maps) was in two parts:

- Country Success and COVID-19 Cumulative Cases World Map (Figure 3);

- Country Success and COVID-19 Excess Deaths World Map (Figure 4).

CSC Map displaying priorities for country success and COVID-19 cumulative cases of over 500 (a) and under 500 (b) per 100,000 of the population. Examining 169 world countries and developing CSC Maps, we used correlation and multiple criteria analysis methods. The priorities of the Country Success and COVID-19 Cumulative Cases World Map shown in Figure 3a are outlined next. The data found on the X-axis of the CSC Map displays the priorities of the country's success and, on the Y-axis, the cumulative cases of COVID-19 per 100,000 population. The results from the dimensions of the priorities of a country's success on the CSC Map come from 8 (a) and 15 (b) variables (tables S2 and S3). Eight country clusters comprise the dimensions of this map; these relate to the classifications from the 2020 World Cultural Map and the 2021 World Values Survey. Two closely related country clusters, the English-speaking group and Protestant Europe, are combined into one, due to their common histories, cultural interactions, comparable developmental levels and similar religious orientations. Results indicating improvement in the priorities of a country's success appear as movements to the left of the CSC Map. Meanwhile, cases of COVID-19 illnesses appear as an upward movement. How residents respond to the dynamic situation of COVID-19 illnesses can be forecast by where a country is located on the CSC Map. Evidentially, residents of successful countries indicate a greater chance of sickness due to COVID-19. The CSC Map systematically displays concentrated clusters of countries that are polarized and interconnected. These clusters are independent of the countries under investigation. These clusters are also independent of the quantity of their descriptive variables.

a)



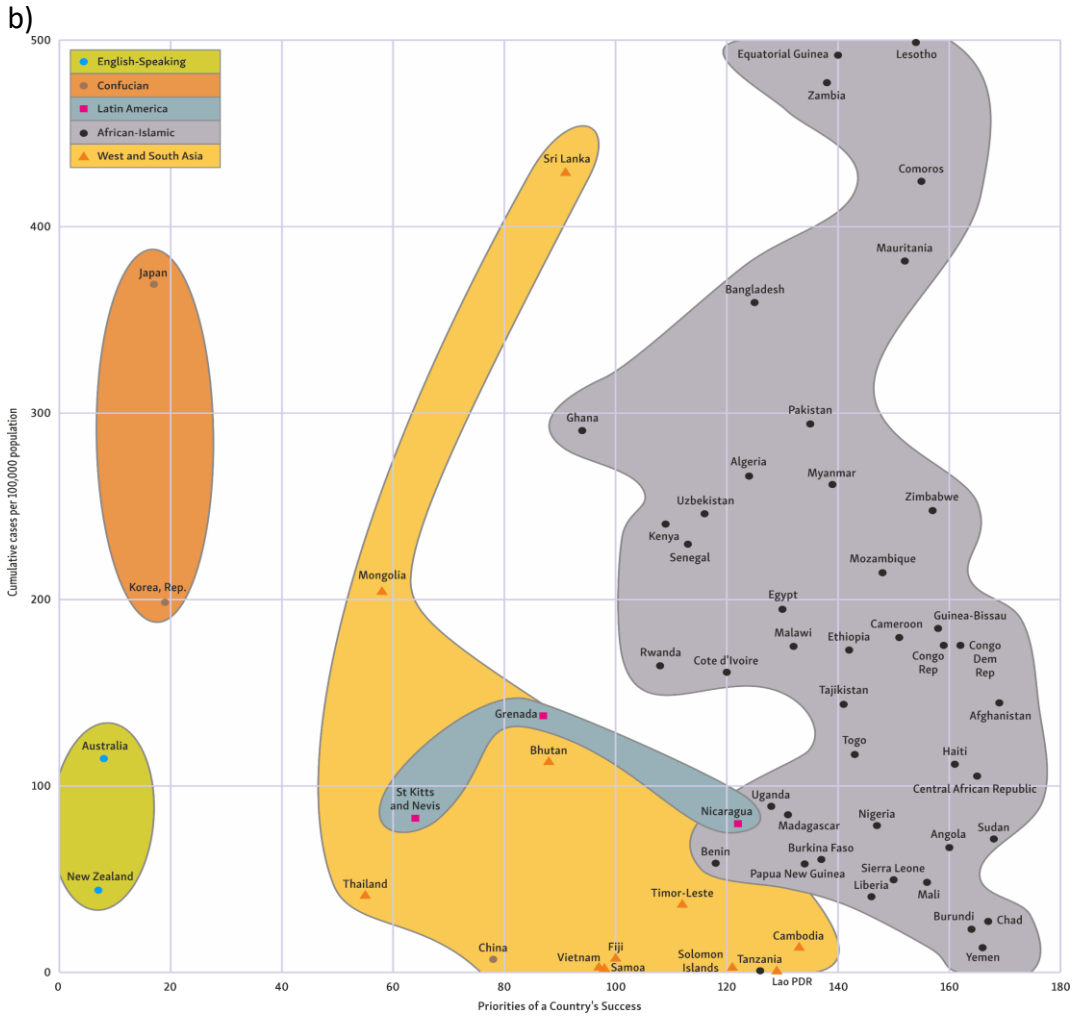


Figure 3. Country Success and COVID-19 Cumulative Cases World Map

CSC Map displaying priorities for country success and COVID-19 cumulative cases of over 500 (a) and under 500 (b) per 100,000 of the population. The priorities pertinent to the success of countries appear on the X-axis, and cumulative cases per 100,000 of the population appear on the Y-axis of this CSC Map. The priorities pertinent to a country achieving success were established based on the INVAR method for a multiple criteria analysis[15], as well as on a comprehensive consideration of a system consisting of eight (a) and fifteen (b) variables (Table 4) that describe the priorities leading to a country's success. The CSC Map consists of countries grouped into seven clusters taken from the 2020 World Cultural Map. Two clusters, the English-speaking group and Protestant Europe, were combined into one due to their common histories, cultural interactions, similar levels of development and religious beliefs. This CSC Map contains an array of countries that were not analyzed by the 2020 Inglehart–Welzel Cultural Map of the World. The priority group that shows an improvement of a country's success level appears as a movement to the left on the CSC Map. COVID-19 cumulative cases are indicated by an upward movement on this map. Responses to the dynamic changes prompted by the COVID-19 pandemic can be predicted by the location of a country on the CSC Map. Those people residing in the more successful countries face an increased chance of becoming sick with COVID-19. Country clusters systematically concentrate in a polarized, interconnected way on the culture map. These clusters are independent of the countries under investigation, as well as of the number of variables descriptive of a country.

The 12 countries included in Protestant Europe and the English-speaking cluster on the CSC Map match those on the 2020 World Cultural Map (Inglehart, 2021). According to the World Factbook (2021), Canada (offical English-speaking population: 58.7%, official French-speaking population: 22%) and Ireland (English is the official language, and is generally used) are countries where English is a de jure and a de facto official language. Therefore, Ireland was also added to the cluster (Figure 3a). Not all countries, such as Israel, are within their own clusters. However, this can be explained, as follows: The populations of countries also matter. For example, the membership of the top 200 most influential intellectuals in the United States include half who are 100% Jewish by descent (Chua and Rubenfeld, 2014; Dershowiz, 1997). Americans who have won the Nobel Prize include 37% who

are ethnically Jewish (Jinfo). Thus it might be considered by some to be understandable why Israel appears alongside the United States on the CSC Map (Figure 3a).

Both on the CSC Map and the 2020 World Cultural Map (Inglehart, 2021), the Orthodox Europe cluster includes the same 13 countries. This European cluster also includes Cyprus because Eastern Orthodox Christians constitute 89% of its population, according to the World Factbook (2021).

On the CSC Map, 15 countries included in the Latin America cluster match those on the 2020 World Cultural Map (Chile is located in the West and South Asia cluster). The two Caribbean countries under analysis from the 2020 Inglehart–Welzel Cultural Map of the World (Inglehart, 2021) are Haiti along with Trinidad and Tobago. The 2020 World Cultural Map (Inglehart, 2021) unnecessarily includes the Philippines, an Asian country which belongs to the West and South Asia cluster on the CSC Map. With an additional 15 Latin American and Caribbean countries, the Latin America cluster on the CSC Map includes 30 countries.

The West and South Asia cluster on the 2020 Inglehart–Welzel Cultural Map of the World (Inglehart, 2021) includes seven countries (India and Indonesia are located in the African-Islamic cluster). All of these countries are shown in Figure 3. In addition, Figure 3 shows all the countries from the West and South Asia cluster under analysis.

On the Inglehart–Welzel World Cultural Map (Inglehart, 2021), the African-Islamic cluster includes 34 countries. At the time of the creation of the CSC Map, some of Palestine's data for the 15 indicators was not available. All these countries are shown in Figure 3.

On the CSC Maps shown in Figures 3 and 4, 13 countries in the Catholic Europe cluster (Andorra has been excluded, because some of its data for the 15 criteria were not available) match those on the Inglehart–Welzel World Cultural Map (Inglehart, 2021). In addition, this cluster includes Malta, where 83% of the population is Roman Catholic, according to the 2019 Eurobarometer. Estonia and Latvia are countries in the Baltic region of northern Europe. In the World Values Survey wave 6 map (2010–2014), Lithuania, Estonia, and Latvia had their own Baltic cluster, which has recently developed very close ties to Scandinavian countries. The latest Inglehart–Welzel World Cultural Map (Inglehart, 2021) no longer includes this Baltic cluster. Most post-Soviet countries belong either to the Catholic or Orthodox Europe cluster. Among the three clusters, Estonia and Latvia are closer to the Catholic Europe cluster and, therefore, have been included there.

The Confucian cluster on the Inglehart–Welzel World Cultural Map (Inglehart, 2021) includes six countries. At the time of the creation of the CSC Map, some data was not available for Taiwan (China), Hong Kong SAR (China), and Macao SAR (China). The remaining countries are shown in Figures 3 and 4.

Indications of priorities for countries appearing on the X-axis, and up to 500 cumulative cases per 100,000 of the population due to COVID-19 appearing on the Y-axis, constitute the CSC Map. Fifteen variables determine the priority of a country, which comprises one of the dimensions on the CSC Map (table S2). The development of the CSC Map involved adapting clusters from the 2020 Inglehart–Welzel Cultural Map of the World (Inglehart, 2021). The countries that do not belong to these clusters are not shown on the CSC Map. These countries include East Asian Mongolia, the Republic of Mauritius (an island in the Indian Ocean) and Oceanian Fiji, Samoa, the Solomon Islands, Mauritius, and Papua New Guinea. The CSC Map indicates the improvement of a country's priority results by moving in parallel to the left and rising cumulative cases due to COVID-19 by moving upward. Here, Australia, China, and New Zealand are exceptions to the rule (Figure 3b).

The Map on Country Success and COVID-19 Excess Deaths was created with the goal of performing a thorough examination of the interconnections between country success and COVID-19. The successes of countries, along with their excess deaths per 100,000 of the population due to COVID-19, are mapped out to indicate any relationship between them. A system of eight variables comprises the dimensions on the CSC Map indicating the success of countries (table S3). A growth in a country's success results in a fall of the number of excess deaths due to COVID-19, which the

Map clearly illustrates. The excess deaths per 100,000 of the population of the country represented decreases in parallel with its success. The 2020 Inglehart–Welzel Cultural Map of the World provided the eight country clusters for this study. Two culturally related country clusters, which were English-speaking and Protestant Europe, have been integrated into one cluster in this map. The compilation of this map only used data on 84 countries pertinent to excess deaths per 100,000 of the population due to COVID-19, which was sourced from The Economist. The 15 necessary indicators under consideration were not all available for six of the 84 countries that were submitted. Thus, only 78 countries were analyzed for this study. Countries that did not belong to the seven clusters under consideration, for instance, Mongolia in East Asia and Mauritius in Oceania, are not represented on the CSC Map. The two predominant dimensions—country success on the horizontal X-axis and excess deaths on the vertical Y-axis—show the differences between different societies and clusters. The site of the country on the CSC Map is established by these two dimensions. Indicators of country success and sustainability express the common values inherent to a country cluster (Figure 4).

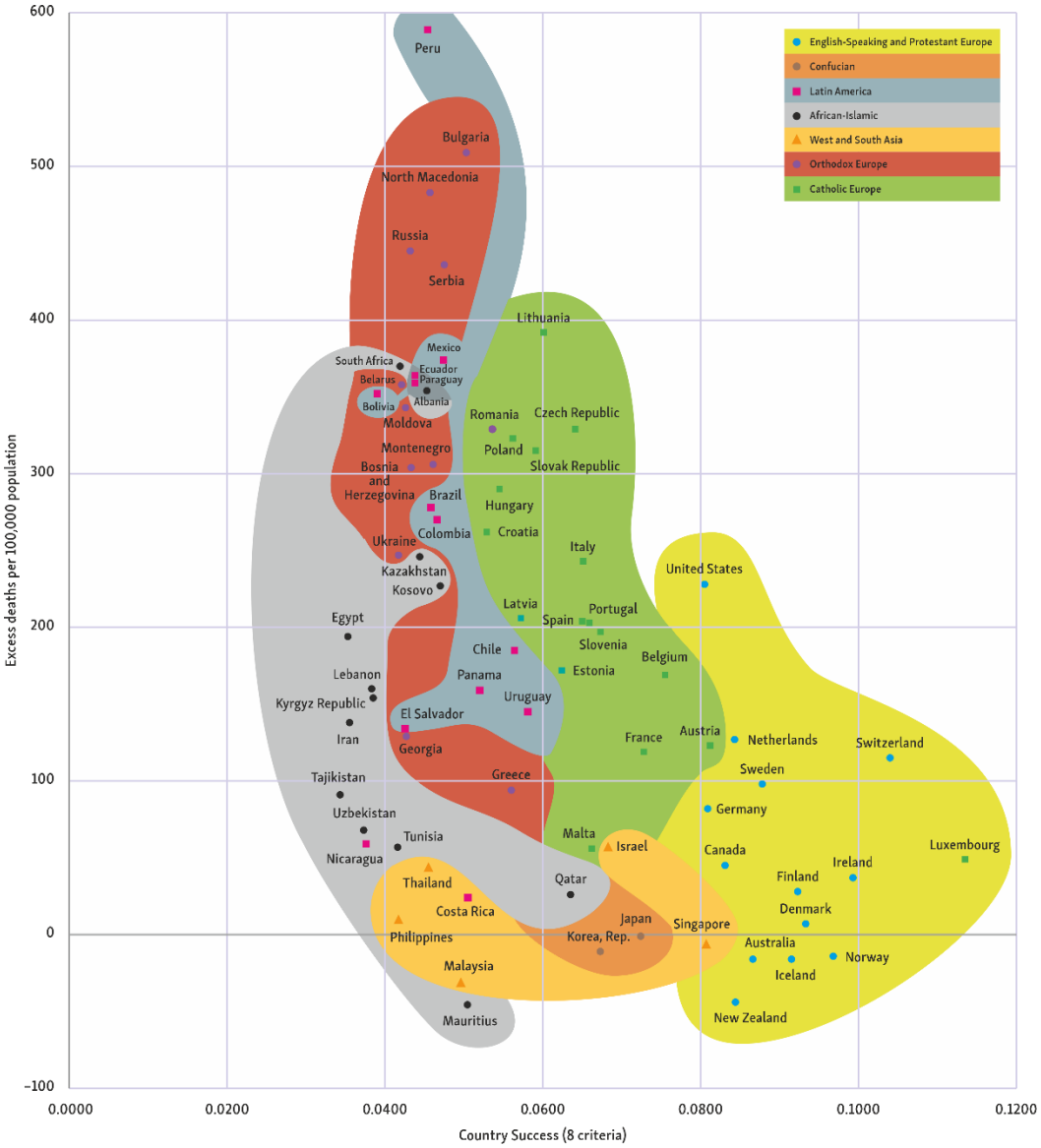


Figure 4. Country Success and COVID-19 Excess Deaths World Map

A thorough investigation of the link between a country's success and COVID-19 excess deaths is represented. The Country Success and COVID-19 Excess Deaths Map was employed to serve this stated objective. It displays visually the link between the successes of countries and their respective COVID-19 excess deaths per 100,000 of the population. A system of criteria consists of eight variables (Table 4). This composite of variables comprises the country success dimensions on the

CSC Map. This map shows a decline in COVID-19 excess deaths whenever country success is on an upswing. Heightened success appears in parallel with fewer excess deaths per 100,000 of the population for countries. Two dimensions highlight the predominant differences among countries. The horizontal X-axis on the CSC Map displays the country success dimension. Meanwhile the other vertical Y-axis displays the excess deaths dimension. The location of a country on the CSC Map relates to these two dimensions. Indicators of country success and sustainability reflect the values that country clusters share in common.

Figure 4, which shows the Country Success and COVID-19 Excess Deaths World Map, is explained next.

On the CSC Map, 11 countries included in the Protestant Europe and English-speaking cluster match those on the Inglehart–Welzel World Cultural Map (Inglehart, 2021). The UK has been excluded, because The Economist (2021a) does not provide its data on excess deaths per 100,000 of the population. Many indicators analyzed in this research and characterized as a group by a country's success indicators suggest that Luxembourg is much closer to the countries in Protestant Europe and the English-speaking group than to those in the Catholic Europe cluster. For a while, Luxembourg was in a political union with the Netherlands as a result of the Treaty of London. The administrative languages spoken in the country are Luxembourgish, French, and German; the country has borders with Germany, France, and Belgium. Only three countries in Europe allow euthanasia: Belgium (since 2002), Luxembourg (since 2009), and the Netherlands (since 2002) (Coutinho, 2016). No wonder, then, that Luxembourg falls into the Protestant Europe and English-speaking cluster (Figure 4).

Both on the CSC Map and the Inglehart–Welzel World Cultural Map (Inglehart, 2021), the Orthodox Europe cluster includes the same 12 countries, but The Economist (2021a) provides no data on excess deaths for Armenia.

The Latin America cluster on the Inglehart–Welzel World Cultural Map (Inglehart, 2021) includes 16 countries. The Economist (2021a) provides no data on excess deaths for six countries: Argentina, Guatemala, Venezuela, Haiti, Puerto Rico, and Trinidad. With the addition of El Salvador, Panama, and Paraguay, the Latin America cluster on the CSC Map includes a total of 13 countries.

The West and South Asia cluster on the Inglehart–Welzel World Cultural Map (Inglehart, 2021) includes seven countries (India and Indonesia are located in the African-Islamic cluster). The Economist (2021a) provides the data on excess deaths for only five countries in the West and South Asia cluster; they are all shown in Figure 4.

The African-Islamic cluster on the Inglehart–Welzel World Cultural Map (Inglehart, 2021) includes 34 countries. At the time of the creation of the CSC Map, some of Palestine's data for the 15 indicators was not available. The Economist (2021a) provides the data on excess deaths for only 13 countries in the African-Islamic cluster, and they are all shown in Figure 4.

Figure 4, therefore, visually supports the second point of Hypothesis 3 that as the success of a country grows, excess deaths from COVID-19 per 100,000 population decrease in parallel. This figure clearly shows that the increasing priority of country success, from left to right, corresponds to decreasing excess deaths from COVID-19 per 100,000 population

Not all countries, such as China, Israel, Estonia, Latvia, and Tanzania are within their own CSC Map clusters. For example, an oddity on the CSC Map is Tanzania, which is not in the its cluster. Nonetheless, it is near the African-Islamic cluster. Another is China, which is near to Vietnam on the CSC Map, as these countries share a border (Figure 3). An analogous situation exists in other similar studies, which we briefly describe below.

Some boundaries of the cultural zones overlap: The ex-communist zone, for instance, overlaps with the Catholic, Protestant, Orthodox, Confucian, and African-Islamic cultural zones. The situation is similar in Britain, which is both an English-speaking country and a historically Protestant European

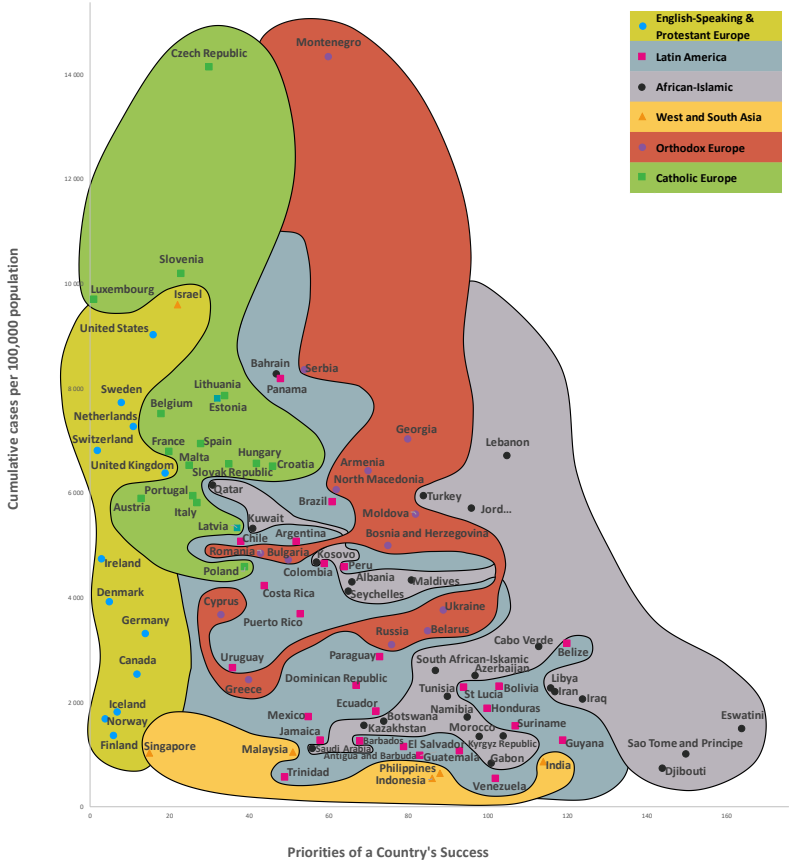
country. Britain is close to all six of the other English-speaking countries, which puts it in that zone on our map. With a minor adjustment, though, Britain—due to its cultural closeness to Protestant societies—could have ended up in Protestant Europe on the map. Reality is complex. Thus, the empirical position of Britain, a country at the intersection of Protestant Europe and the English-speaking zone, reflects both aspects of reality. Another boundary, even broader, could put Catholic Europe, Ireland, Latin America, and the Philippines in a broad cultural zone of Roman Catholicism. All of these zones can be justified both empirically and conceptually. The two-dimensional cultural maps take into account the similarity of basic values. At the same time, they reflect how these societies are different and distant from each other in many other dimensions, such as their colonial influences, the impact of communist rule, the level of economic development, religion, and the structure of the work force (Inglehart and Welzel, 2005).

The former and the current world powers form the pool of English-speaking countries; there are more features shared by West Germany with Sweden than with the other countries. New Zealand and Australia share more features with the former and the current world powers than with each other. The social set-up of Canada is close to that of Great Britain, Norway, Sweden, and the USA, and Finland is somewhat different from the other Northern countries. These are all instances of various similarities and differences (Haller, 2003). The following dimensions mapping these distances *of* class profiles are possible (Haller, 2003): common culture, historical connections, the welfare state, and industrial development. In the context of the discussion proposed by Haller (2003), this typology also serves as a warning against thinking that the label “Europe” means the European countries share more similarities with each other than with other countries.

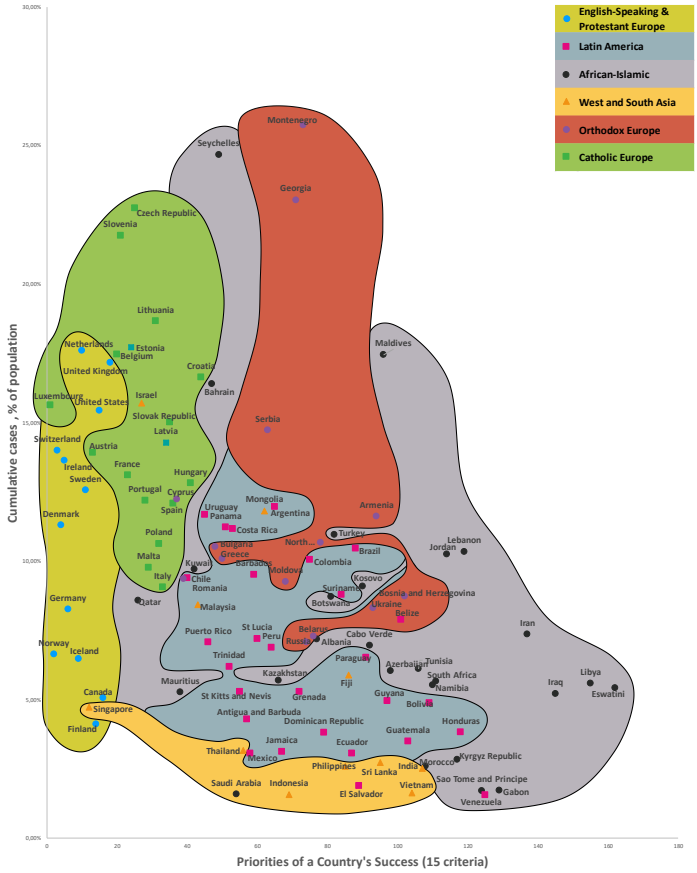
The CSC Maps of the world presented here visually validate the hypotheses raised along with the statistical studies that have been performed using the data.

Figure 5 compares the Country Success and COVID-19 Cumulative Cases World Maps from 28 March 2021 (a) and 23 December 2021 (b). CSC Map displaying priorities for country success and COVID-19 cumulative cases of over 500 (a1) and under 500 (a2) per 100,000 of the population (Figure 5a). Also, Figure 5b showing priorities for country success and COVID-19 cumulative cases of over 1.5% (b1) and under 1.5% (b2) of the population. The priority of a country’s success is based on 2020 data and has been calculated using an 8-citeria system (a) and a 15-criteria system (b). The y-axis is identical on both maps. The data on cumulative cases per 100,000 population (Figure 5a) have been transformed and expressed as a percentage (Figure 5b). One thousand infections per 100,000 population on the CSC Map in 7a1, for instance, correspond to 1% of a country’s population infected on the CSC Map in 7b1, and 3,000 infections per 100,000 population in 7a1 correspond to 3% infected in 7b1 (Figure 5).

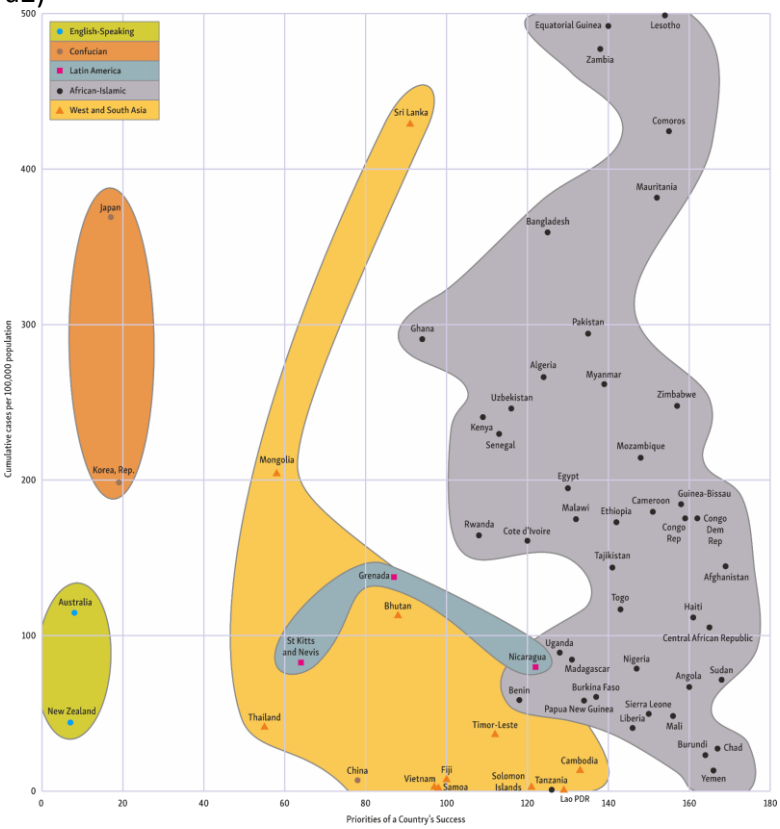
a1) COVID-19 cumulative cases, 28 March 2021



b1) COVID-19 cumulative cases, 23 December 2021



a2)



b2)

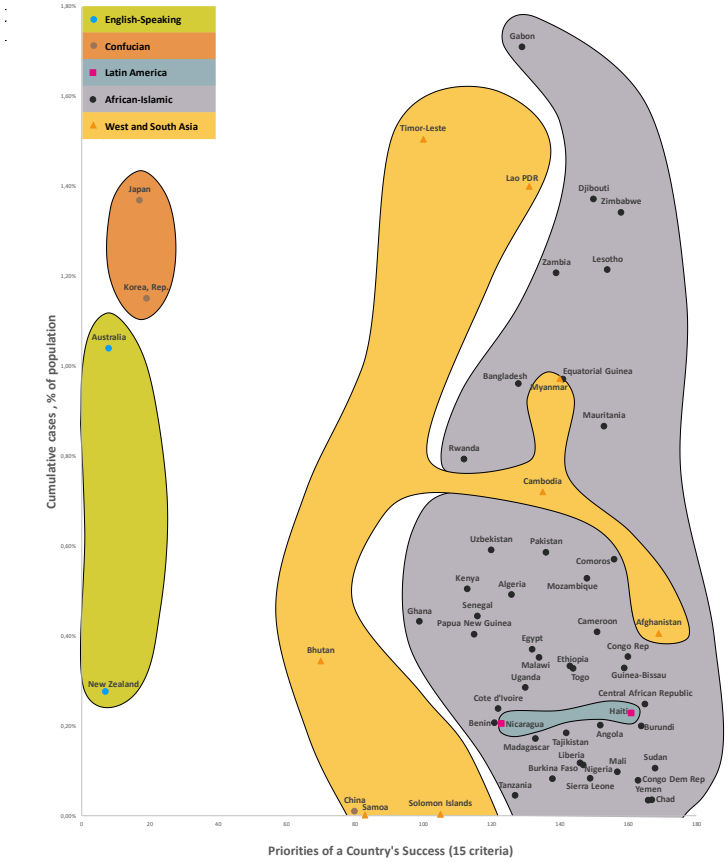


Figure 5. CSC cumulative cases per 100,000 population, a visual comparison of Country Success and COVID-19 Cumulative Cases World Maps**,** 28 March 2021 (a) and 23 December 2021 (b)

The position of country clusters on the CSC Map changes little over time. For instance, the bases for analyzing cumulative cases per 100,000 population were the 28 March 2021 data (figure 5a, WHO 2021a) and the 23 December 2021 data (figure 5b, WHO 2021b). These data show strong, positive and statistically significant dependency ($r=0.939$, $p<0.01$). The bases for analyzing excess deaths per 100,000 population were the 31 August 2021 data (figure 4, The Economist 2021a) and the 22 December 2021 data (Figure 5, The Economist 2021b). These data show strong, positive and statistically significant dependency ($r=0.942$, $p<0.01$). The layout of the clusters over time on the CSC Map is very similar, and their correlations are as well (figures 5a and 5b). The percentage of people ill with COVID-19 in 169 countries, as per 22 December 2021 data, indicates a strong, negative and statistically significant relationships on the priority ranking of a respective country's success based on 2021 data. These numbers were established according to a 15-criteria system ($r=-0.646$, $p<0.01$) and according to an 8-criteria system ($r=-0.678$, $p<0.01$). Almost nine months later, the overall country clusters show little change in their position on the CSC Map. Only two clusters in the middle of the CSC Map (African-Islamic and Latin America) show a noticeable change in their boundaries

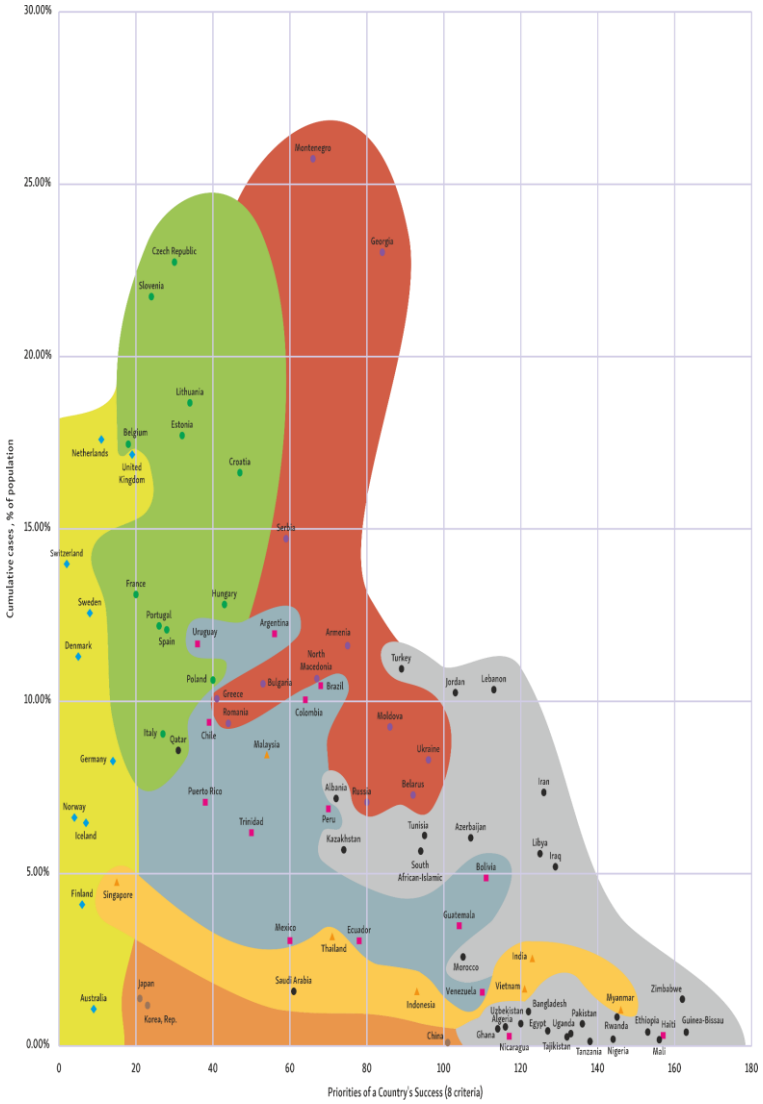


Figure 6. The Country Success (2020) and COVID-19 Cumulative Cases (23 December 2021) World Map with the 2020 World Cultural Map countries

Figure 6 shows the Country Success and COVID-19 Cumulative Cases World Map with the 2020 World Cultural Map countries. This map is a visual confirmation of the claim stated in the first point of Hypothesis 3 that as the success of a country grows, cumulative cases increase in parallel. This figure makes it evident that an increase in country success priority (from right to left) corresponds to an increase in COVID-19 cumulative cases.

5. COVID comparison charts

Based on the available data and the performed analysis, the comparative graphs of the COVID by decades (Fig. 7).

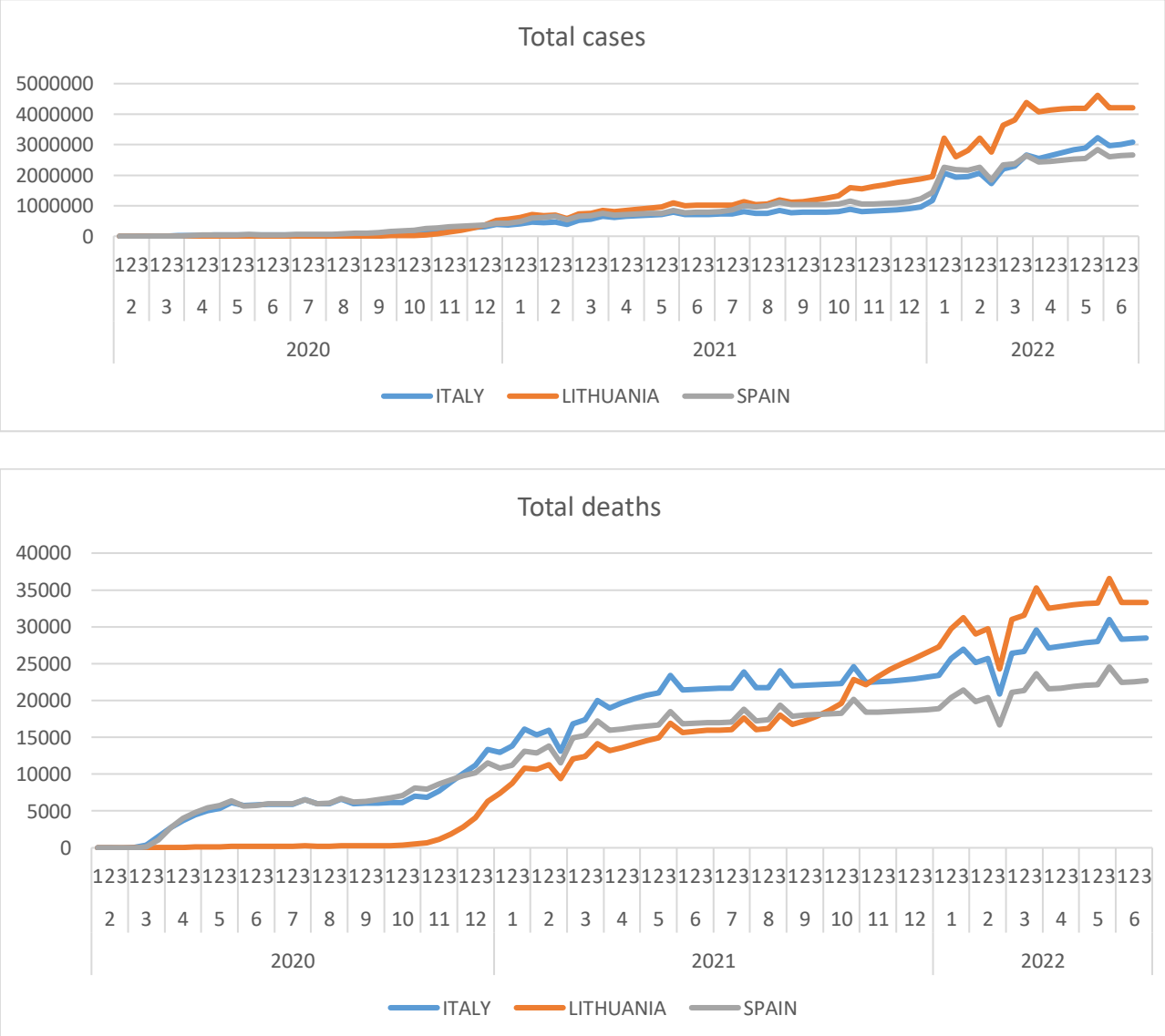
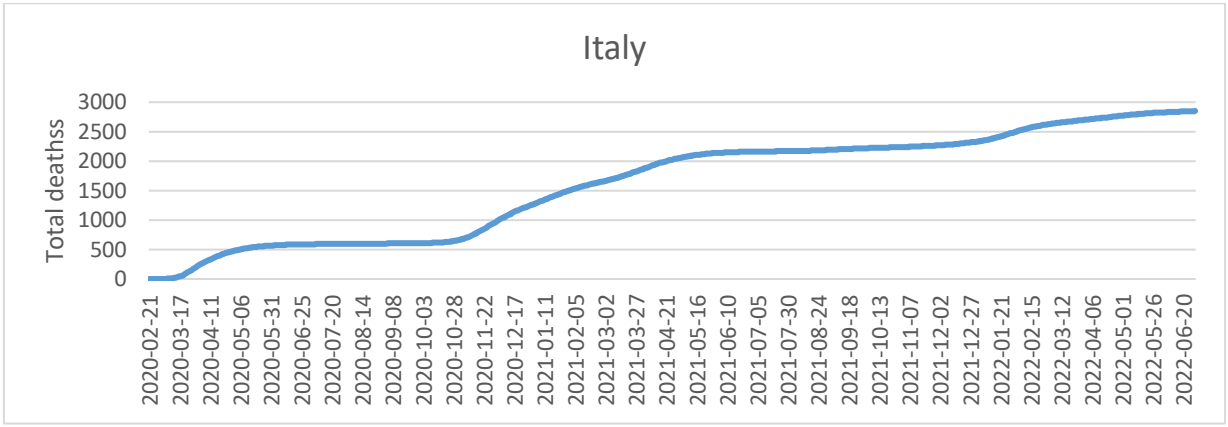
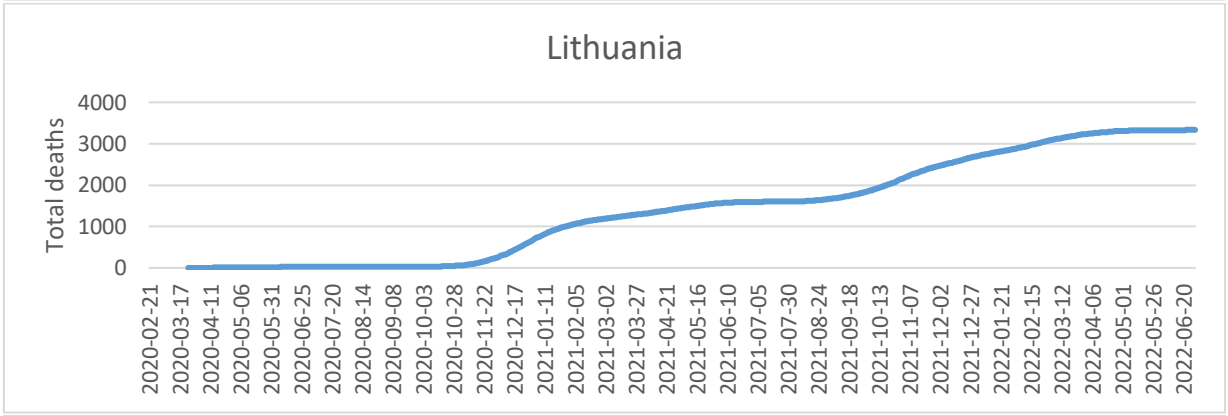
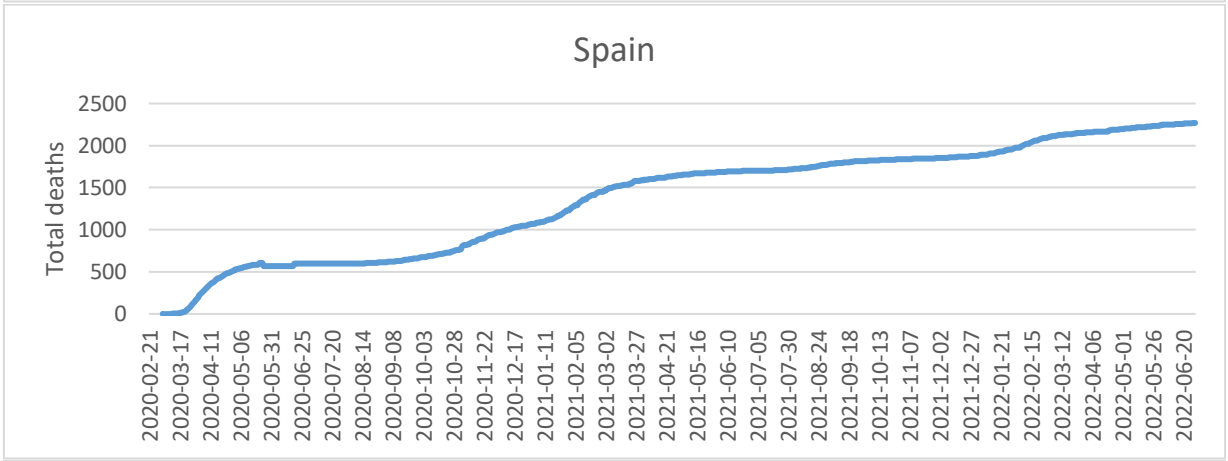


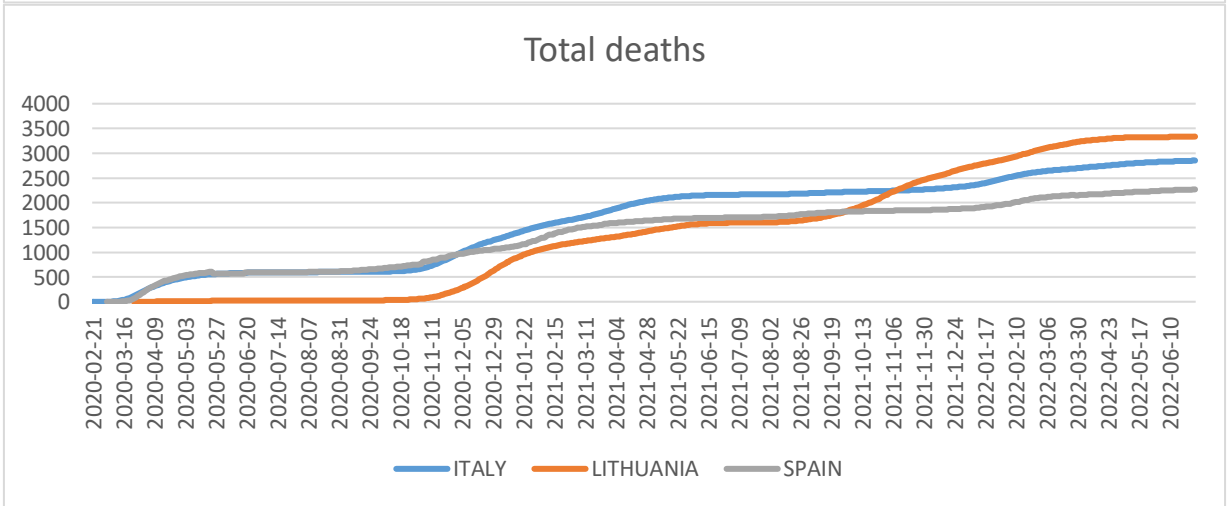
Fig. 7. COVID comparison charts by decade according to total cases and total death.

Graphs were also made by day (Fig. 8). The obtained data are presented below.


Italy
Total deathss
3000
2500
2000
1500
1000
500
0
2020-02-21
2020-03-17
2020-04-11
2020-05-06
2020-05-31
2020-06-25
2020-07-20
2020-08-14
2020-09-08
2020-10-03
2020-10-28
2020-11-22
2020-12-17
2021-01-11
2021-02-05
2021-03-02
2021-03-27
2021-04-21
2021-05-16
2021-06-10
2021-07-05
2021-07-30
2021-08-24
2021-09-18
2021-10-13
2021-11-07
2021-12-02
2021-12-27
2022-01-21
2022-02-15
2022-03-12
2022-04-06
2022-05-01
2022-05-26
2022-06-20


Lithuania
Total deaths
4000
3000
2000
1000
0
2020-02-21
2020-03-17
2020-04-11
2020-05-06
2020-05-31
2020-06-25
2020-07-20
2020-08-14
2020-09-08
2020-10-03
2020-10-28
2020-11-22
2020-12-17
2021-01-11
2021-02-05
2021-03-02
2021-03-27
2021-04-21
2021-05-16
2021-06-10
2021-07-05
2021-07-30
2021-08-24
2021-09-18
2021-10-13
2021-11-07
2021-12-02
2021-12-27
2022-01-21
2022-02-15
2022-03-12
2022-04-06
2022-05-01
2022-05-26
2022-06-20


Spain
Total deaths
2500
2000
1500
1000
500
0
2020-02-21
2020-03-17
2020-04-11
2020-05-06
2020-05-31
2020-06-25
2020-07-20
2020-08-14
2020-09-08
2020-10-03
2020-10-28
2020-11-22
2020-12-17
2021-01-11
2021-02-05
2021-03-02
2021-03-27
2021-04-21
2021-05-16
2021-06-10
2021-07-05
2021-07-30
2021-08-24
2021-09-18
2021-10-13
2021-11-07
2021-12-02
2021-12-27
2022-01-21
2022-02-15
2022-03-12
2022-04-06
2022-05-01
2022-05-26
2022-06-20


Total deaths
4000
3500
3000
2500
2000
1500
1000
500
0
2020-02-21
2020-03-16
2020-04-09
2020-05-03
2020-05-27
2020-06-20
2020-07-14
2020-08-07
2020-08-31
2020-09-24
2020-10-18
2020-11-11
2020-12-05
2020-12-29
2021-01-22
2021-02-15
2021-03-11
2021-04-04
2021-04-28
2021-05-22
2021-06-15
2021-07-09
2021-08-02
2021-08-26
2021-09-19
2021-10-13
2021-11-06
2021-11-30
2021-12-24
2022-01-17
2022-02-10
2022-03-06
2022-03-30
2022-04-23
2022-05-17
2022-06-10
ITALY
LITHUANIA
SPAIN

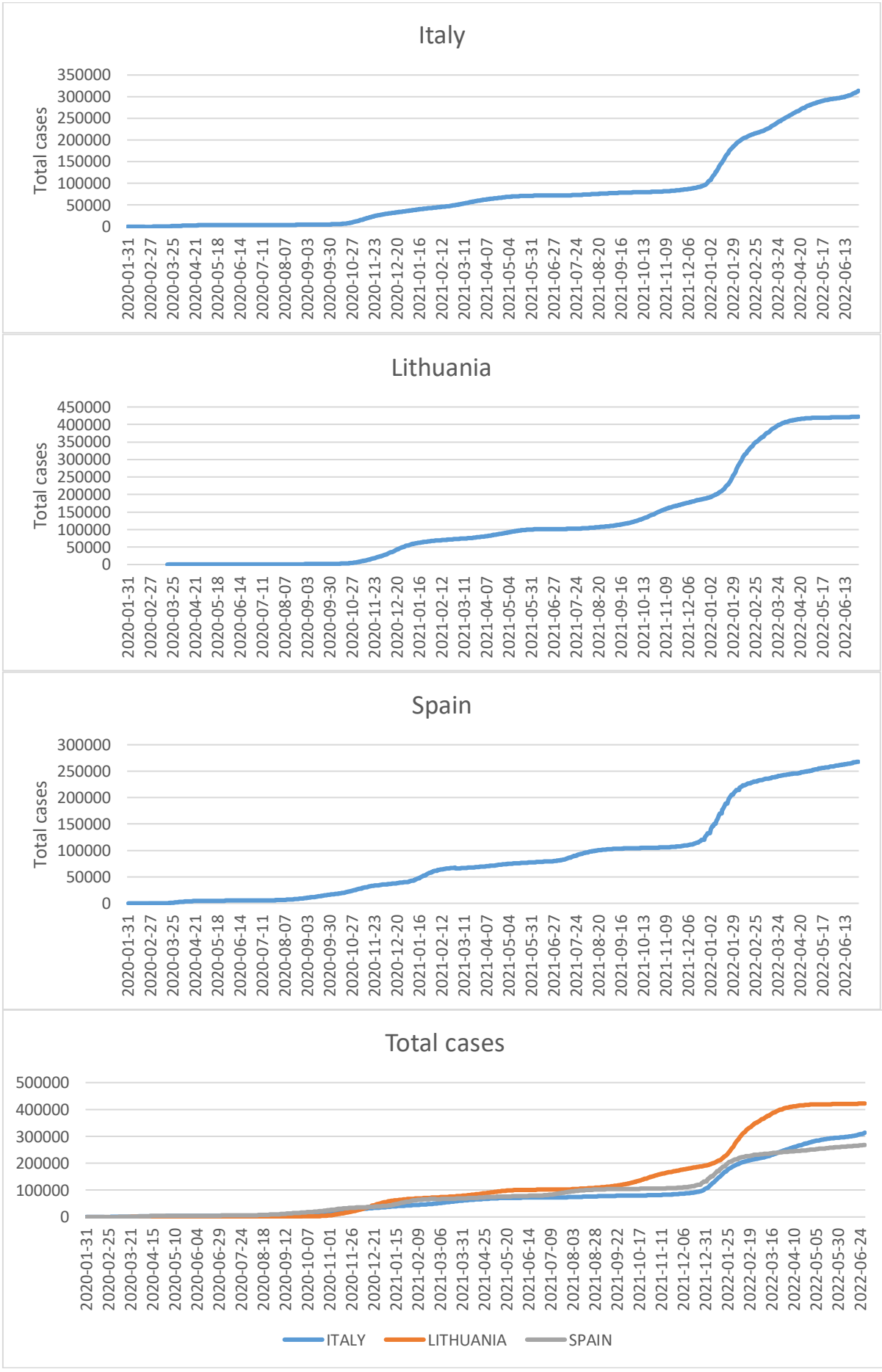


Fig. 8. COVID comparison charts by days.

References

Abelinde, C.B., 2012. Human Development and Country Governance as Determinants of Environmental Performance. International Journal of Information Technology and Business Management 7 (1), 44–52.

Agarwal, B., 2018. Gender inequality, cooperation, and environmental sustainability. In Inequality, cooperation, and environmental sustainability pp. 274–313. Princeton University Press. http://dx.doi.org/10.2307/j.ctv301grk.14.

Ahmed, F., Ahmed, N.E., Pissarides, C., Stiglitz, J., 2020. Why inequality could spread COVID-19. The Lancet Public Health 5 (5), e240. http://dx.doi.org/10.1016/S2468-2667(20)30085-2.

Allcott, H., Boxell, L., Conway, J., Gentzkow, M., Thaler, M., Yang, D., 2020. Polarization and public health: Partisan differences in social distancing during the coronavirus pandemic. Journal of Public Economics 191, 104254. https://doi.org/10.1016/j.jpubeco.2020.104254.

Ansari, M., Ehrampoush, M.H., Farzadkia, M., Ahmadi, E., 2019. Dynamic assessment of economic and environmental performance index and generation, composition, environmental and human health risks of hospital solid waste in developing countries; A state of the art of review. Environment international 132, 105073. http://dx.doi.org/10.1016/j.envint.2019.105073.

Anttiroiko, A.V., 2021. Successful government responses to the pandemic: Contextualizing national and urban responses to the COVID-19 outbreak in east and west. International Journal of E-Planning Research (IJEPR) 10 (2), 1–17. http://dx.doi.org/10.4018/IJEPR.20210401.oa1.

Ball, P., 2021. Why England's COVID 'freedom day' alarms researchers. Nature 595 (7868), 479–480. http://dx.doi.org/10.1038/d41586-021-01938-4.

Bashir, M.F. et al., 2020. Correlation between climate indicators and COVID-19 pandemic in New York, USA. Science of the Total Environment 728, 138835. http://dx.doi.org/10.1016/j.scitotenv.2020.138835.

Bedford, J. et al., 2020. COVID-19: towards controlling of a pandemic. The Lancet 395 (10229), 1015–1018. http://dx.doi.org/10.1016/S0140-6736(20)30673-5.

Beugelsdijk, S., Welzel, C., 2018. Dimensions and dynamics of national culture: Synthesizing Hofstede with Inglehart. Journal of cross-cultural psychology 49 (10), 1469–1505. http://dx.doi.org/10.1177/0022022118798505.

Brauner, J.M. et al., 2021. Inferring the effectiveness of government interventions against COVID-19. Science 371 (6531). http://dx.doi.org/10.1126/science.abd9338.

Brülhart, M., Klotzbücher, V., Lalive, R., Reich, S.K., 2021. Mental health concerns during the COVID-19 pandemic as revealed by helpline calls. Nature 600, 121–126. http://dx.doi.org/10.1038/s41586-021-04099-6.

Bucher, S., 2017. Environmental performance as one of the indicators of sustainable development in Asia. Journal of Environmental Biology 38 (1), 67. http://dx.doi.org/10.22438/jeb/38/1/PRN-106.

Chhokar, J.S., Brodbeck, F.C., House, R.J., 2007. Culture and Leadership across the World: The GLOBE Book of In-Depth Studies of 25 Societies. Lawrence Erlbaum Associates. Mahwah, New Jersey, NJ. http://dx.doi.org/10.4324/9780203936665.

Chua, A., Rubenfeld, J., 2014. The Triple Package: How Three Unlikely Traits Explain the Rise and Fall of Cultural Groups in America. Penguin Press HC. pp. 53–54. ISBN 978-159420546.

Cohen, J., Kupferschmidt, K., 2020. Countries test tactics in 'war' against COVID-19. Science 367 (6484). http://dx.doi.org/10.1126/science.367.6484.1287.

Conceição, P., Hall, J., Jahic, A., Kovačević, M.S., Nayyar, S., Ortubia, A., et al., 2020. COVID-19 and Human Development: Assessing the Crisis, Envisioning the Recovery. United Nations Development Programme.

Coutinho, J.P., 2016. Religiosity in Europe: an index, factors, and clusters of religiosity. Sociologia, Problemas e Práticas 81, 163–188. http://dx.doi.org/10.7458/SPP2016816251.

Cracolici, M.F., Cuffaro, M., Nijkamp, P., 2010. The measurement of economic, social and environmental performance of countries: A novel approach. Social indicators research 95 (2), 339–356. http://dx.doi.org/10.1007/S11205-009-9464-3.

Dershowiz, A., 1997. The Vanishing American Jew: In Search of Jewish Identity for the Next Century. Hachette p. 11.

Desai, H., Forsberg, E., 2020. Multidimensional fragility in 2020. OECD Development Co-operation Working Papers No. 79. OECD Publishing, Paris. https://doi.org/10.1787/22220518.

Desmet, K., Wacziarg, R., 2021. Understanding spatial variation in COVID-19 across the United States. Journal of urban economics 103332. https://doi.org/10.3386/w27329.
Deutsche Bank, 2021. COVID-19: a threat to sustainable development or an opportunity?
Dias, J.M.de A., Salgado, E.G., Barbosa, S., Alvarenga, A.D, Lira, J.M., 2017. Assessment of the Sustainability of Countries at Worldwide. J. Mgmt. & Sustainability 7, 51. http://dx.doi.org/10.5539/jms.v7n4p51.
Djankov, S., Panizza, U., 2020. COVID-19 in developing economies. Centre for Economic Policy Research. https://doi.org/10.4000/poldev.3455.
Dobewall, H., Strack, M., 2014. Relationship of Inglehart's and Schwartz's value dimensions revisited. International Journal of Psychology 49 (4), 240–248. http://dx.doi.org/10.1002/ijop.12004.
Economist Intelligence Unit, 2021. Democracy Index 2020: In sickness and in health? EIU.com.
Economist, T., 2020. Tracking COVID-19 excess deaths across countries. The Economist.
Economist, T., 2021. Tracking COVID-19 excess deaths across countries. The Economist. 31 August 2021.
Economist, T., 2021. Tracking COVID-19 excess deaths across countries. The Economist. 22 December 2021.
Ellwanger, J.H. et al., 2020. News from a postpandemic world. Science 369 (6499), 26–29. http://dx.doi.org/10.1126/science.abd1320.
Evans, J.H., Hargittai, E., 2020. Who doesn't trust Fauci? The public's belief in the expertise and shared values of scientists in the COVID-19 pandemic. Socius 6, 237802312094733. https://doi.org/10.1177/23780231209473.
Fernández, D. et al., 2021. Are environmental pollution and biodiversity levels associated to the spread and mortality of COVID-19? A four-month global analysis. Environmental Pollution 271, 116326. https://doi.org/10.1016/j.envpol.2020.116326.
Fincher, C.L., Thornhill, R., Murray, D.R., Schaller, M., 2008. Pathogen prevalence predicts human cross-cultural variability in individualism/collectivism. Proc R Soc B Biol Sci. 263; 275 (1640), 1279–1285. http://dx.doi.org/10.1098/rspb.2008.0094.
Fischer, A., Peters, V., Vávra, J., Neebe, M., Megyesi, B., 2011. Energy use, climate change and folk psychology: Does sustainability have a chance? Results from a qualitative study in five European countries. Global Environmental Change 21 (3), 1025–1034. http://dx.doi.org/10.1016/j.gloenvcha.2011.04.008.
Fog, A., 2020. A Test of the Reproducibility of the Clustering of Cultural Variables. Cross-Cultural Research 55 (1), 29–57. http://dx.doi.org/10.1177/1069397120956948.
Fog, A., 2021. A test of the reproducibility of the clustering of cultural variables. Cross-Cultural Research 55 (1), 29–57. http://dx.doi.org/10.1177/1069397120956948.
Fu, H., Hereward, M., MacFeely, S., Me, A., Wilmoth, J., 2020. How COVID-19 is changing the world: A statistical perspective from the Committee for the Coordination of Statistical activities. Statistical Journal of the IAOS (Preprint), 1–10. http://dx.doi.org/10.3233/SJI-200759.
Furceri, D., Loungani, P., Ostry, J.D., Pizzuto, P., 2020. Will COVID-19 affect inequality? Evidence from past pandemics. Covid Economics 12 (1), 138–157.
Gallego-Álvarez, I., Vicente-Galindo, M., Galindo-Villardón, M. & Rodríguez-Rosa, M., 2014. Environmental performance in countries worldwide: Determinant factors and multivariate analysis. Sustainability 6 (11), 7807–7832. http://dx.doi.org/10.3390/su6117807.
García-Sánchez, I.M., das Neves Almeida, T.A., de Barros Camara, R.P., 2015. A proposal for a Composite Index of Environmental Performance (CIEP) for countries. Ecological Indicators 48, 171–188. http://dx.doi.org/10.1016/j.ecolind.2014.08.004.
Gouveia, V.V., Ros, M., 2000. Hofstede and Schwartz s models for classifying individualism at the cultural level: their relation to macro-social and macro-economic variables. Psicothema 12 (Su1), 25–33.
Grogan, J., 2020. States of emergency. European Journal of Law Reform 22 (4), 339. http://dx.doi.org/10.5553/EJLR/138723702021022004002.
Haller, M., 2003. Class structure in Europe. ME Sharpe. United Nations. Department of Economic and Social Affairs Economic Analysis Vol.5. http://dx.doi.org/10.4324/9781315489698.
Harris, M., Bhatti, Y., Buckley, J., Sharma, D., 2020. Fast and frugal innovations in response to the COVID-19 pandemic. Nature medicine 26 (6), 814–817. http://dx.doi.org/10.1038/s41591-020-0889-1.
Haug, N. et al., 2020. Ranking the effectiveness of worldwide COVID-19 government interventions. Nature human behaviour 4 (12), 1303–1312. http://dx.doi.org/10.1038/s41562-020-01009-0.

Heath, R., Jin, B., 2020. Ranking the global impact of the coronavirus pandemic, country by country. By RYAN HEATH and BEATRICE JIN (05/21/2020 2:44 PM EDT.
Helliwell, J.F., Layard, R., Sachs, J., De Neve, J.E., 2021. World happiness report 2021.
Hofstede, G., 1986. Cultural differences in teaching and learning. International Journal of intercultural relations 10 (3), 301–320. http://dx.doi.org/10.1016/0147-1767(86)90015-5.
Hofstede, G., 2001. Culture's Consequences: Comparing Values, Behaviors, Institutions, and Organizations across Nations. 2nd ed. Sage, Thousand Oaks, CA, 261.
Hsu, S.Y., Woodside, A.G., Marshall, R., 2013. Critical tests of multiple theories of cultures' consequences: Comparing the usefulness of models by Hofstede, Inglehart and Baker, Schwartz, Steenkamp, as well as GDP and distance for explaining overseas tourism behavior. Journal of Travel Research 52 (6), 679–704. http://dx.doi.org/10.1177/0047287512475218.
Hueting, R., Reijnders, L., 2004. Broad sustainability contra sustainability: the proper construction of sustainability indicators. Ecological economics 50 (3–4), 249–260. http://dx.doi.org/10.1016/j.ecolecon.2004.03.031.
Inglehart, R., 1997, Modernization and postmodernization: Cultural, economic and political change in 43 societies. Princeton, NJ: Princeton University Press. http://dx.doi.org/10.2307/j.ctv10vm2ns.
Inglehart, R., 2018. Cultural evolution: Peoples motivations are changing and reshaping the world. Cambridge University Press. http://dx.doi.org/10.1017/9781108613880.
Inglehart, R., 2021. World Cultural Map–World Values Survey.
Inglehart, R., Welze, C., 2010. The WVS cultural map of the world. World Values Survey.
Inglehart, R., Welzel, C., 2005. Modernization, Cultural Change and Democracy: The Human Development Sequence. New York, Cambridge University Press. http://dx.doi.org/10.1017/CBO9780511790881.
Jarynowski, A., Wójta-Kempa, M., Płatek, D., Belik, V., 2020. Social values are significant factors in control of COVID-19 pandemic–preliminary results.
Jewish Recipients of the John Bates Clark Medal in Economics. Jinfo. http://www.jinfo.org/Clark_Economics.html.
Jordan, J., Yoeli, E., Rand, D., 2020. Don't get it or don't spread it? Comparing self-interested versus prosocially framed COVID-19 prevention messaging. PsyArXiv 10.
Kaasa, A., 2021. Merging Hofstede, Schwartz, and Inglehart into a Single System. Journal of Cross-Cultural Psychology 52 (4), 339–353. https://doi.org/10.1177/00220221211011244.
Kaklauskas, A., 2016. Degree of project utility and investment value assessments. International Journal of Computers Communications & Control 11 (5), 666–683. http://dx.doi.org/10.15837/ijccc.2016.5.2679.
Kaklauskas, A. et al., 2018. Multiple criteria analysis of environmental sustainability and quality of life in post-Soviet states. Ecological indicators 89, 781–807. http://dx.doi.org/10.1016/j.ecolind.2017.12.070.
Kaklauskas, A. et al., 2020. Are environmental sustainability and happiness the keys to prosperity in Asian nations? Ecological Indicators 119, 106562. http://dx.doi.org/10.1016/j.ecolind.2020.106562.
Kapitány-Fövény, M., Sulyok, M., 2020. Social markers of a pandemic: modeling the association between cultural norms and COVID-19 spread data. Humanities and Social Sciences Communications 7 (1), 1–9. http://dx.doi.org/10.1057/s41599-020-00590-z.
Lampert, M., Inglehart, R., Metaal, S., Schoemaker, H., Papadongonas, P., 2021. Covid Pandemic Ignites Fear, but Boosts Progressive Ideals and Calls for Inclusive Economic Growth, Measuring the Pandemic's Impact on Social Values, Emotions and Priorities in 24 Countries. Glocalities. 23 February 2021.
Lannelongue, G., Gonzalez-Benito, J., Quiroz, I., 2017. Environmental management and labour productivity: The moderating role of capital intensity. Journal of environmental management 190, 158–169. http://dx.doi.org/10.1016/j.jenvman.2016.11.051.
Lenton, T.M., Boulton, C.A., Scheffer, M., 2021. Trust boosts recovery of countries from COVID-19. medRxiv.
Levin, A.T., Hanage, W.P., Owusu-Boaitey, N., Cochran, K.B., Walsh, S.P., Meyerowitz-Katz, G., 2020. Assessing the age specificity of infection fatality rates for COVID-19: Systematic review, meta-analysis, and public policy implications. European Journal of Epidemiology 35, 1123–1138. https://doi.org/10.1007/S10654-020-00698-1.
Li, L.M.W., Bond, M.H., 2010. Value change: Analyzing national change in citizen secularism across four time periods in the World Values Survey. The Social Science Journal 47 (2), 294–306. http://dx.doi.org/10.1016/j.soscij.2009.12.004.

Liu, K., He, M., Zhuang, Z., He, D., Li, H., 2020. Unexpected positive correlation between human development index and risk of infections and deaths of COVID-19 in Italy. One Health 10, 100174. http://dx.doi.org/10.1016/j.onehlt.2020.100174.
Loayza, N.V., Pennings, S., 2020. Macroeconomic policy in the time of COVID-19: A primer for developing countries. World Bank Research and Policy Briefs 147291.
Maaravi, Y., Levy, A., Gur, T., Confino, D., Segal, S., 2021. The tragedy of the commons: How individualism and collectivism affected the spread of the COVID-19 pandemic. Frontiers in Public Health 9, 37. https://doi.org/10.3389/fpubh.2021.627559.
Maccari, N., 2014. Environmental Sustainability and Human Development: A Greening of Human Development Index. March 15 2014. Available at SSRN: https://ssrn.com/abstract=2426073 or http://dx.doi.org/10.2139/ssrn.2426073.
Mavragani, A., Nikolaou, I.E. & Tsagarakis, K.P., 2016. Open economy, institutional quality, and environmental performance: A macroeconomic approach. Sustainability 8 (7), 601. http://dx.doi.org/10.3390/su8070601.
Mazzanti, M. & Zoboli, R., 2009. Environmental efficiency and labour productivity: Trade-off or joint dynamics? A theoretical investigation and empirical evidence from Italy using NAMEA. Ecological Economics 68 (4), 1182–1194. http://dx.doi.org/10.1016/j.ecolecon.2008.08.009.
McIntosh, W.A., Thomas, J.K., 2004. Economic and other societal determinants of the prevalence of HIV: A test of competing hypotheses. Sociological Quarterly 45 (2), 303–324. http://dx.doi.org/10.1111/j.1533-8525.2004.tb00014.x.
Messner, W., 2020.The institutional and cultural context of cross-national variation in COVID-19 outbreaks. medRxiv.
Moldan, B., Janoušková, S., Hák, T., 2012. How to understand and measure environmental sustainability: Indicators and targets. Ecological Indicators 17, 4–13. http://dx.doi.org/10.1016/j.ecolind.2011.04.033.
Mormina, M., Nsofor, I.M., 2020. What developing countries can teach us about how to respond to a pandemic. The Conversation Trust (UK) Limited.
Moti, U.G., Ter Goon D., 2020. Novel Coronavirus Disease: A delicate balancing act between health and the economy. Pakistan journal of medical sciences 36 (COVID19-S4), S134. http://dx.doi.org/10.12669/pjms.36.COVID19-S4.2751.
Mulki, J.P., Caemmerer B., Heggde, G.S., 2015. Leadership style, salesperson's work effort and job 268 performance: The influence of power distance. J Pers Sell Sales Manag. 35 (1), 3–22. https://doi.org/10.1080/08853134.2014.958157.
Mundial, B., 2021. Doing Business 2020. Washington, DC: World Bank, DOI, 10, 978–1.
Nilashi, M. et al., 2019. Measuring sustainability through ecological sustainability and human sustainability: A machine learning approach. Journal of Cleaner Production 240, 118162. http://dx.doi.org/10.1016/j.jclepro.2019.118162.
Nordt, C., Warnke, I., Seifritz, E., Kawohl, W., 2015. Modelling suicide and unemployment: a longitudinal analysis covering 63 countries, 2000–11. The Lancet Psychiatry 2 (3), 239–245. http://dx.doi.org/10.1016/S2215-0366(14)00118-7.
Nov, O. et al., 2021. Preferences and patterns of response to public health advice during the COVID-19 pandemic. Scientific reports 11 (1), 1–7. http://dx.doi.org/10.1038/s41598-021-01186-6.
Phillis, Y.A., Grigoroudis, E., Kouikoglou, V.S., 2011. Sustainability ranking and improvement of countries. Ecological Economics 70 (3), 542–553. http://dx.doi.org/10.1016/j.ecolecon.2010.09.037.
Ren, X., Fang, H., 2016. A Study on Classification of Sustainable and Unsustainable Countries. In 2016 International Conference on Applied Mathematics, Simulation and Modelling pp. 79–82. Atlantis Press. http://dx.doi.org/10.2991/amsm-16.2016.19.
Roper, W., 2020. Science, politics, and public health. Science 370 (6515). http://dx.doi.org/10.1126/science.abf2837.
Rosén, M., Stenbeck, M., 2020. Interventions to suppress the coronavirus pandemic will increase unemployment and lead to many premature deaths. Scandinavian Journal of Public Health 1403494820947974. http://dx.doi.org/10.1177/1403494820947974.
Saisana, M., Philippas, D., 2012. Sustainable Society Index (SSI): Taking societies' pulse along social, environmental and economic issues. Environmental Impact Assessment Review 32, 94–106.

Sajadi, M.M. et al., 2020. Temperature, humidity, and latitude analysis to estimate potential spread and seasonality of coronavirus disease 2019 (COVID-19). JAMA network open 3 (6), e2011834–e2011834. http://dx.doi.org/10.1001/jamanetworkopen.2020.11834.
Schell, C.J. et al., 2020. The ecological and evolutionary consequences of systemic racism in urban environments. Science 369 (6510). http://dx.doi.org/10.1126/science.aay4497.
Schwartz, S.H., 1999. A theory of cultural values and some implications for work. Applied psychology 48 (1), 23–47. http://dx.doi.org/10.1111/j.1464-0597.1999.tb00047.x.
Schwartz, S.H., Ros, M., 1995.Values in the West: A theoretical and empirical challenge to the individualism-collectivism cultural dimension. World psychology 1 (2), 91–122.
Solomon, T. et al., 2010. Virology, epidemiology, pathogenesis, and control of enterovirus 71. The Lancet Infectious Diseases 281; 10 (11), 778–790. http://dx.doi.org/10.1016/S1473-3099(10)70194-8.
Soper, G.A., 1919. The lessons of the pandemic. Science 49, 501–506. http://dx.doi.org/10.4324/9781315254227-15.
Steenkamp, J.B.E., Geyskens, I., 2012. Transaction cost economics and the roles of national culture: a test of hypotheses based on Inglehart and Hofstede. Journal of the Academy of Marketing Science 40 (2), 252–270. http://dx.doi.org/10.1007/S11747-011-0266-1.
Steenkamp, J.B.E.M., 2001. The Role of National Culture in International Marketing Research. International Marketing Review 18 (1), 30–44. http://dx.doi.org/10.1108/02651330110381970.
Stockmaier, S. et al., 2021. Infectious diseases and social distancing in nature. Science 371 (6533). http://dx.doi.org/10.1126/science.abc8881.
Suh, J., Horvitz, E., White, R.W., Althoff, T., 2021. Population-scale study of human needs during the COVID-19 pandemic: Analysis and implications. In Proceedings of the 14th ACM International Conference on Web Search and Data Mining pp. 4–12. https://doi.org/10.1145/3437963.3441788.
Taylor, L., 2021. Why scientists worldwide are watching UK COVID infections. Nature 599 (7884), 189–190. http://dx.doi.org/10.1038/d41586-021-03003-6.
Tan, Y., Shuai, C., Jiao, L., Shen, L., 2017. An adaptive neuro-fuzzy inference system (ANFIS) approach for measuring country sustainability performance. Environmental Impact Assessment Review 65, 29–40. http://dx.doi.org/10.1016/j.eiar.2017.04.004.
The World Factbook, 2021. Central Intelligence Agency.
Van de Kerk, G., Manuel, A.R., 2008. A comprehensive index for a sustainable society: The SSI—the Sustainable Society Index. Ecological Economics 66 (2–3), 228–242. http://dx.doi.org/10.1016/j.ecolecon.2008.01.029.
Van Dorn, A., Cooney, R.E., Sabin, M.L., 2020. COVID-19 exacerbating inequalities in the US. The Lancet (London, England) 395 (10232), 1243. http://dx.doi.org/10.1016/S0140-6736(20)30893-X.
Wade, L., 2020. From Black Death to fatal flu, past pandemics show why people on the margins suffer most. Science. http://dx.doi.org/10.1126/science.abc7832.
Welzel, C., 2013. Freedom Rising. Human Empowerment and the Quest for Emancipation. Cambridge University Press.
Wendling, Z.A., Emerson, J.W., de Sherbinin A., Esty D.C., et al., 2020. 2020 Environmental Performance Index. New Haven, CT: Yale Center for Environmental Law & Policy.epi.yale.edu.
Whiteley, P., Clarke, H.D., Stewart, M., 2020. If health equals happiness, will coronavirus make the world an unhappier place? The Conversation Trust (UK) Limited.
World Bank, 2020. The global economic outlook during the COVID-19 pandemic: A changed world. World Bank Feature Story.
World Health Organization, 2020. Air Pollution. Accessed 20 May 2020. https://go.nature.com/38fFWTb.
World Health Organization, 2021. COVID-19 weekly epidemiological update. 30 March 2021.
Wu, X., Nethery, R.C., Sabath, M.B., Braun, D., Dominici, F., 2020. Air pollution and COVID-19 mortality in the United States: Strengths and limitations of an ecological regression analysis. Science advances 6 (45), p.eabd4049. http://dx.doi.org/10.1126/sciadv.abd4049.
Zavadskas, E.K., Kaklauskas, A., Sarka, V., 1994. The new method of multi-criteria complex proportional assessment of projects. Technol. Econ. Dev. Econ. 3, 131–139.