

# How much do we know about countries preparedness to respond to pandemics? Insights from two country-level indices



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The Covid-19 pandemic is shedding light on the vulnerability of health systems, including in rich countries, that many thought were best prepared to face epidemics. As of April 16, the country with the highest number of reported cases and deaths due to Covid-19 is the United-States. This is likely to continue as the number of reported cases and deaths continue to grow in the United-States. As a share of the population, besides small city-states, Spain, Belgium, Italy, France and the United Kingdom report the highest number of deaths per capita. By contrast, countries located closer to where the disease outbreak started - such as Singapore or South Korea - seem to have managed more effectively the Covid-19 outbreak. Some of these countries have started to loosen up lockdown measures.

The situation remains highly unpredictable. Data and statistics on cases and mortality due to Covid-19 move rapidly. Experts question at times their reliability. Yet, it is already clear that much of what

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we thought to know about countries' health systems and their ability to cope with such a major public health challenge was incomplete or incorrect. This raises important questions on how we measure countries' preparedness.

This paper presents a first comparison between two country-level indices that aim to measure countries' preparedness to face epidemics. One produced before Covid-19 and one that has recently been released following the initial outbreaks. The findings on this latter index remain preliminary and will be updated as the health crisis unfolds. These two measures received a lot of media attention in the past few weeks. The paper aims to highlight potential limitations in pre-Covid-19 measures of health systems' preparedness and capacities to face epidemics but also to identify other reasons, non-health related, that might affect the effectiveness of countries' responses to disease outbreaks.

### **The Covid-19 “reality” check between health care systems' supposed preparedness and responses**

In November 2019, a consortium of organizations<sup>2</sup> released the Global Health Security (GHS) Index. The goal of the GHS is to help understand and measure improvement in global capability to prevent, detect, and respond to infectious disease threats. It is according to the consortium, and to our knowledge, the first comprehensive assessment of global health security preparedness. The GHS covers 195 countries and territories. It is based on a comprehensive framework that comprises 140 questions organized around six categories: Prevention, Detection and reporting, Rapid response, Health system, Compliance with international norms and risk environment. More details on what each category aims to capture is available in the supplementary material section. Overall, the United States, the United Kingdom and the Netherlands topped the global 2019 GHS ranking.

In March 2020, the Deep Knowledge Group (a consortium of profit and non-profit organizations) released the Covid-19 Safety, Risk and Treatment Efficiency framework and indices. The Indices cover 150 countries. They use 72 metrics grouped into three indices (Safety, Risk and Treatment Efficiency) and twelve underlying quadrants. The data is collected from publicly available sources including World Health Organization, Johns Hopkins University, Worldometers, and the CDC. Many elements of the methodology and results are proprietary and have not been released publicly. This makes it impossible to fully assess this new index and its sub-components. The top 40 ranks for the “Safety” Index are accessible online. The “Safety” Index includes four quadrants: Quarantine efficiency, Government management efficiency, Monitoring and detection and Emergency treatment readiness. More details are available in the supplementary material section. Overall, Israel, Germany and South Korea topped the 2020 Covid-19 Safety Index. The Covid-19 Safety Index is dynamic; scores and ranks have already evolved since it was launched and will continue to evolve over time as the health crises unfold.

One would assume that the top performers in the November 2019 GHS Index would also perform best in terms of responses based on the preliminary results from the Covid-19 Safety Index. However, looking at 43 countries for which data are available on both indices as of 15 April 2020<sup>3</sup>, there is no correlation in the GHS ranks and Covid-19 Safety ranks (see figure below). While a few countries like Australia and South Korea rank well on both indices, the two top performers in the GHS – the United-Kingdom and United-States – are not in the top 40 performers in the Covid-19 Safety Index. Other OECD countries that ranked well (in the top 20) in the November GHS index such

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<sup>2</sup> The GHS Index is a project of the Nuclear Threat Initiative (NTI) and the Johns Hopkins Center for Health Security (JHU) and was developed with The Economist Intelligence Unit (EIU).

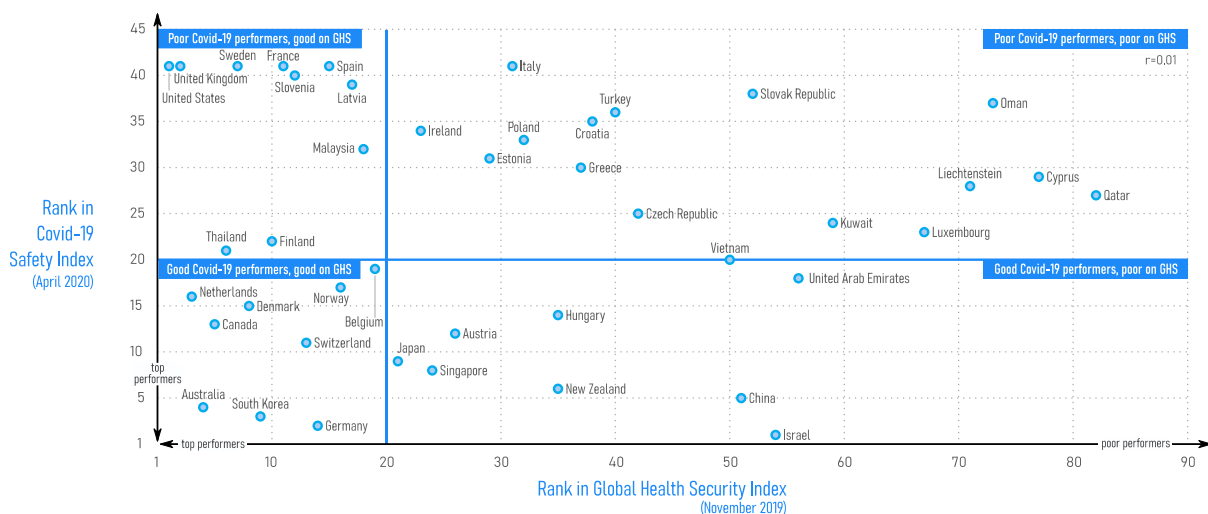
<sup>3</sup> Imputations on the Covid-19 Index ranks were made for six countries that were not included in the top 40 ranks available publicly. These are France, Italy, Spain, Sweden, United Kingdom and the United States. A rank of 41 for these six countries was assumed. These will be updated should we get access to the detailed results.

as France, Spain or Sweden are also not in the top 40 Covid-19 Safety ranks. By contrast, countries such as Austria, China, Hungary, Israel, Japan, New Zealand, Singapore and the United Arab Emirates perform better on the Covid-19 Safety Index than what could be “predicted” by their GHS ranks. Germany performed only 14<sup>th</sup> on the GHS index while it is ranked 2<sup>nd</sup> on the Covid-19 Safety Index, whereas France ranked better than Germany on the GHS index but much worse on the Covid-19 Safety index (not in the top 40).

There is also a very poor relationship between the November GHS ranks & scores and the number of Covid-19 cases and Covid-19 deaths per capita (fig 3.). In our view, death rate is the useful indicator of effectiveness. The number of cases reported might simply reflect that a greater portion of the population are being tested.

## How much do we know about health security and preparedness?

Rank correlation between Covid-19 Safety Countries Index (April 2020) and Global Health Security Index (November 2019)



Note: Excluding Monaco from the figure (outlier). France, Italy, Spain, Sweden, United Kingdom and the United States not in top 40 on Covid-19 (exact ranking unavailable, a rank of 41 was assigned by default) but in top 40 ranks on GHS. When removing these six countries,  $r=0.28$ .

Source: Covid-19 Safety Countries Index, Global Health Security Index & Authors calculations (15/04/2020)

Out of the six categories of the GHS, three really capture the health systems capability to respond to an epidemic outbreak. The three other categories on Prevention, Compliance with international norms and Risk environment capture more issues that go beyond the preparedness of the health care system (including behavioural factors). Yet, even when focusing on the GHS categories related to detection, response, and health preparedness the rank correlation with the Covid-19 Safety Index remains completely random (fig 4). Surprisingly, there is an inverse relationship between the GHS ranks on the “Detection” category and the number of Covid-19 tests per capita according to the data available as of April 16<sup>th</sup> (fig 5).

### Beyond health care system preparedness: The central role of political decisions in shaping the response to epidemic outbreaks

These results suggest that the November 2019 GHS might have greatly overestimated the preparedness and capacity of certain health care systems to respond to major epidemics - particularly those of France, Spain, the United Kingdom and the United States. By contrast, the preparedness of certain countries, including for instance Germany, Singapore and South Korea, seems to have been underestimated.

Considering the level of uncertainty, it is too early to draw any final conclusions. There are uncertainties related to the accuracy of Covid-19 data including on incidence and death rate. Some countries like China have already started to review the number of covid-19 related deaths upwards, and in many OECD countries death rates in nursing homes have not been reported accurately yet. Also, should some countries face a “second wave” of Covid-19 international assessments of countries’ response and effectiveness in managing the pandemic would evolve.

Besides the degree of uncertainty, technical choices made in constructing these indices and ranks (including weights given to certain variables or normalization and aggregation techniques) might also explain some of the discrepancy. The figure above focuses on rank correlations because total scores on the Covid-19 Safety Index are not available. Score correlation should also be conducted to provide a more comprehensive picture. The numerous moving pieces should therefore call for prudence in interpreting these results.

Yet, we highlight below two broad preliminary hypothesis that might explain parts of the discrepancy between the GHS and the Covid-19 Safety Index and other measures of Covid-19 impacts (including incidence and death rates) at country-level.

1. Has the GHS framework put too little emphasis on testing and the adaptability of health systems (including reserve capacity)?

The GHS is meant to apply to a wide range of health and biological risks: natural, intentional, or accidental. Still the key messages and the conceptual framework presented in the November 2019 GHS are highly relevant in the Covid-19 context. The key message of the November GHS report was that most countries are not well prepared to face pandemic threats. The six categories of the GHS framework prove to be very relevant in the Covid-19 context. Under category 1 (prevention) the GHS tracks for instance the existence of surveillance systems for zoonotic diseases/pathogens. Category 2 (early detection) tracks the capacities of national laboratory systems and epidemiology workforce and the existence of electronic reporting surveillance system. Category 3 (rapid response) tracks the existence of national public health emergency plans and Emergency Operations Centers (EOC) and whether countries conducted health emergency exercises recently. Category 4 (Health System) focuses on the capacities of the hospital system (e.g. number of hospital beds) and primary care system (e.g. number of doctors), on the availability of equipment and on measures of access to care (UHC, out of pocket expenditure). It also has a specific focus on processes for approving medical treatments. Category 5 (Norms) and Category 6 (Risk) cover aspects that go much beyond the health care system preparedness including the adoption of international resolutions, recent political statements and risk factors in case of an epidemic outbreak (poverty, education, quality of infrastructure etc.).

The weights assigned to the six categories by the International Expert Panel for the construction of the overall GHS score and ranks also resonates quite well in the current context. Categories 2 (early detection) and 3 (rapid response) have the greatest weight (19.2%), higher than the four other categories (16.7% or less). It is likely that part of the success of Asian countries in dealing with the Covid-19 crisis can be attributed to massive testing, acute surveillance systems and rapid isolation of infected patients. This likely helped flattening the epidemic curve and reduced burden on the hospital system. In fact, in light of the Covid-19 crisis, one could argue that these two categories could be weighted even higher in the GHS methodology. It is possible for users to adjust the weights themselves on the GHS website.

Yet, in light of the Covid-19 crisis, there might be elements of effective disease control and management that might have been overlooked or not adequately captured in the November GHS.

This is highlighted by the comparison of the results obtained by three countries: Germany, South Korea and the United States.

First, the GHS evaluates primarily what is on paper (rules, regulations, processes, existence of specific bodies) based on the judgement of people who developed the index. It relies extensively on binary data (0 or 1) and aggregates altogether 140 data points. The comprehensiveness of the methodology may hide poor performance on some crucial aspects. On category 4 (health system) the United-States (73.2) obtains a much better score than Germany (48.2). While the U.S. performs very poorly on the “Healthcare access” sub-component of the category (measured notably by UHC, out-of-pocket expenditure), this poor results is offset by a perfect score (100) on other dimensions notably on “Communications with health workers during a public health emergency” (measured by two binary questions on the existence of communication systems in place<sup>4</sup>). On this latter dimension Germany obtains a straight 0 which considerably affects its overall performance on the category. This binary score of “all or nothing” based on expert judgement affects greatly the overall results. It is very doubtful that the German health system was less well prepared than the U.S. system to respond to the Covid-19 crisis given their huge hospital capacity and medical staff capacity. Also considering that the U.S. Global Health Security and Biodefense unit — responsible for pandemic preparedness — was dismantled by the current administration in May 2018.

Second, the GHS indicator set might overlook or not capture well enough elements that proved to be crucial in the management of the Covid-19 pandemic. We focus on two elements (there might be others). The first element is the crucial role that testing, surveillance and rapid isolation played in flattening the epidemic curve to avoid excess pressure on the health care and hospital system. In the GHS, the United States scores better (98.2) than Germany (84.6) and South Korea (92.1) on category 2 (detection and reporting). The U.S. also scores better on the subcomponent “Capacity to test and approve new medical countermeasures”. Yet, according to the latest data available as of April 16<sup>th</sup>, the United-States took much more time than Germany and South Korea to test a significant proportion of its population (figure below). As of, April 12<sup>th</sup> the Germans had tested two times more people relative to its population size than the U.S.

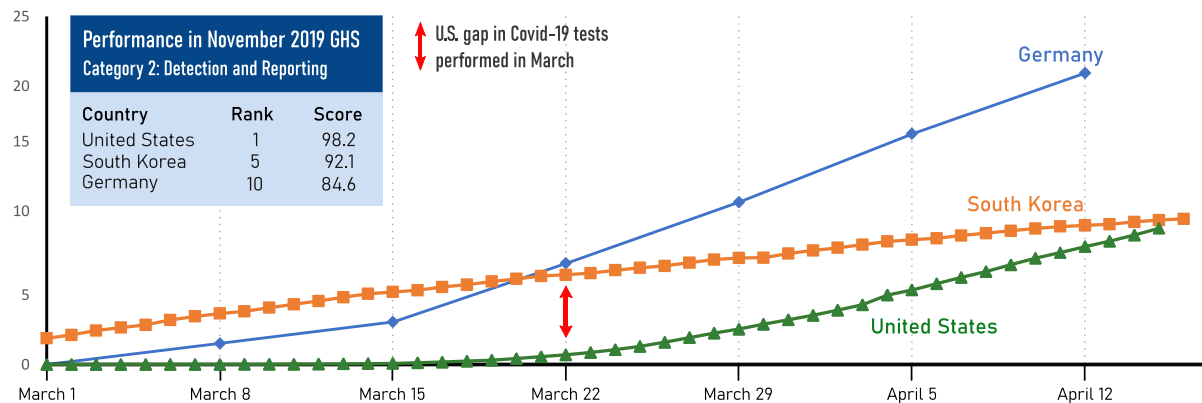
The GHS methodology focuses notably on laboratory capacities to perform WHO-defined core tests and on timely procurement systems. The U.S. performs well on both according to the GHS, but in practice during Covid-19, tests prepared by the U.S. Centers for Disease Control and Prevention proved faulty and tests other than the CDC’s were approved late (on Feb. 29). It is also likely that South Korea was able to mobilize faster the private sector to develop and implement test kits, building on their past experience in dealing with similar epidemics in the past twenty years. These results suggest that the GHS might have overestimated the U.S. capacity to administer massive tests for a new virus like Covid-19.

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<sup>4</sup> The exact questions are: 4.4.1a. Is there a system in place for public health officials and healthcare workers to communicate during a public health emergency? and 4.4.1b. Does the system for public health officials and healthcare workers to communicate during an emergency encompass healthcare workers in both the public and private sector?

## Despite good performance in the 2019 GHS on "Detection and Reporting", the U.S. took longer than Germany and South Korea to test its population during Covid-19

Cumulative Covid-19 tests per 1,000 population



Source: Official sources collected by Our World in Data

The other element is related to the availability of equipment to face a pandemic. In the GHS, the United States obtains a perfect score (100) on the sub-component "Infection control practices and availability of equipment" whereas Germany and South Korea obtain half of the points only (50). Yet, Germany and South Korea did not face greater shortages of protective equipment (including masks) and Germany had a greater number of hospital beds, intensive care beds and ventilators than the United-States to respond to any peak in demand. Here also, the GHS tracks primarily the existence of strategic plans for medical equipment probably because of data availability limitations at the global level. However, this rough dichotomous scoring approach is not precise enough to assess the availability of key equipment to respond to this specific crisis and the ability to mobilize quickly additional equipment, like masks and ventilators.

### 2. The GHS cannot anticipate political decisions and difficult arbitrations

Another interpretation of the poor correlation between pre-Covid-19 measures of preparedness and new indicators developed during Covid-19, is that certain countries *should have* been able to respond in a better way to the Covid-19 health crisis than what they have done as they were, in theory, better prepared. As highlighted above the GHS did not get it *all* wrong; and many of the underlying measures used are highly relevant in the current context. Ultimately, the response and management of an epidemic does not only depend on health care resources and preparedness only, but also to a large extent, on the ability of political leaders to mobilize actors and take the correct decisive actions at the right time.

The decision to shutdown non-essential economic activities to respond to the Covid-19 outbreak was taken by most political leaders in countries highly affected by the virus; albeit at very different speed. There is a growing consensus among experts that this a very effective measure to deal with rapid virus spread but this has huge economic consequences. Most Asian countries, including South Korea, have adopted, and implemented strict confinement measures at a very early stage. Some European countries, including France and Germany, have also adopted rapidly similar approaches. In these cases, health considerations took precedence very early on over any economic considerations. As highlighted in recent OECD and IMF reports, the economic consequences of lockdowns are huge, in terms of production and employment loss. It seems that for some of the countries that topped the GHS ranking – such as the United States and the United Kingdom – the political decision to shutdown

the economy in order to save lives was harder to make and took longer to take effect (or were only implemented in certain States)

As many countries start deconfining, this political trade-off between health and the economy will remain delicate to handle considering on one hand the risk of a second-wave and on the other hand the desperate need of many people and industries to restart economic activities.

This article argues that the lead pre-Covid-19 measure of countries' preparedness to face epidemics – the Global Health Security Index - overestimated the level of preparedness of certain countries (including the United Kingdom and United States) and underestimated the preparedness of other countries (including Germany, South Korea and other Asian countries). This can be partly attributed to the limited emphasis in the GHS methodology on testing and the adaptability of health systems (including reserve capacity for strategic medical equipment). At the same time, it is beyond the scope of the GHS to anticipate rapid and decisive political actions which are critical for the effective management of any epidemics. These findings would need to be updated in light of the evolution of the Covid-19 health crisis.



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Supplementary material:

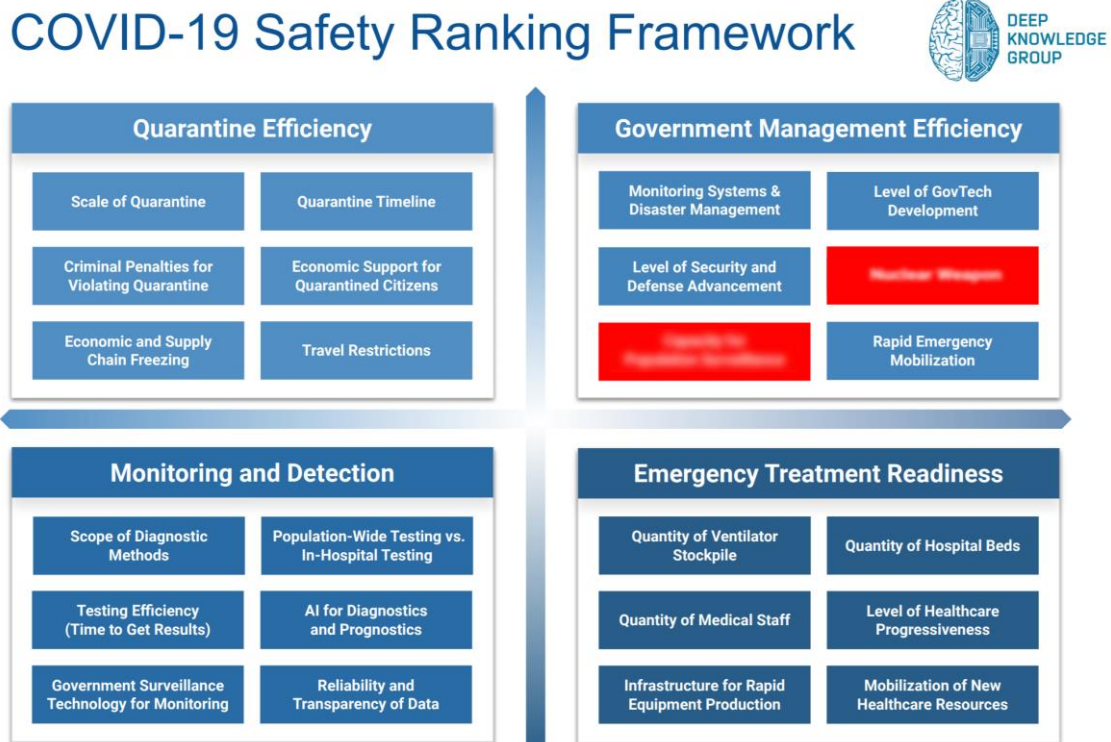
Fig 1. Global Health Security Index : Category Scores



- **Prevention:** Fewer than 7% of countries score in the highest tier for the ability to prevent the emergence or release of pathogens.
- **Detection and Reporting:** Only 19% of countries receive top marks for detection and reporting.
- **Rapid Response:** Fewer than 5% of countries scored in the highest tier for their ability to rapidly respond to and mitigate the spread of an epidemic.
- **Health System:** The average score for health system indicators is 26.4 of 100.
- **Compliance with International Norms:** Less than half of countries have submitted Confidence-Building Measures under the Biological Weapons Convention (BWC) in the past three years, an indication of their ability to adhere to important international norms and commitments related to biological threats.
- **Risk Environment:** Only 23% of countries score in the top tier for indicators related to their political system and government effectiveness.

Source: NTI, JHU, and EIU. 'Global Health Security Index'. Nuclear Threat Initiative, Johns Hopkins Center for Health Security and Economist Intelligence Unit, November 2019. <https://www.ghsindex.org/about/>.

Fig 2. Deep Knowledge Group Covid-19 Safety Index: Framework



By Deep Knowledge Group  
Source: [www.dkv.global/covid](http://www.dkv.global/covid)

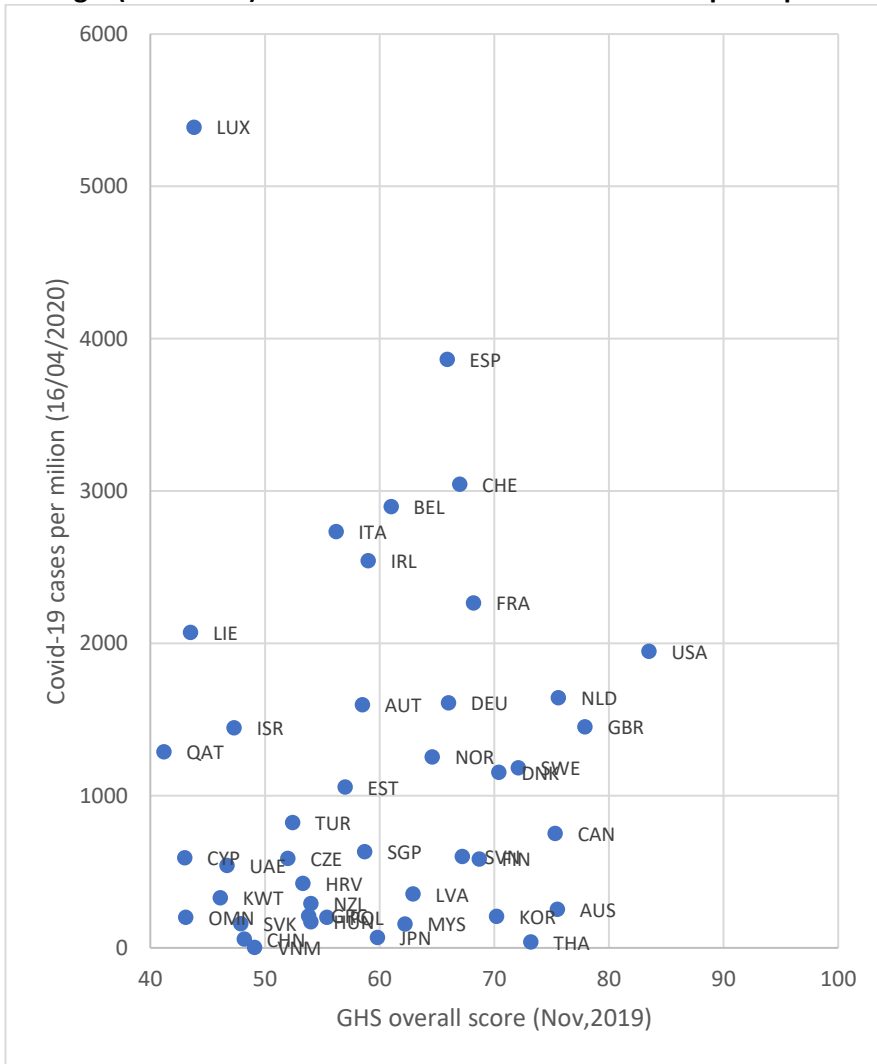
Note: Proprietary metrics marked with red are developed by Deep Knowledge Group specifically for the COVID-19 Safety Ranking Framework and are for internal use only.

Source: Deep Knowledge Group. 'COVID-19 | Analytics'. DKV. Accessed 16 April 2020. <https://www.dkv.global/covid>.



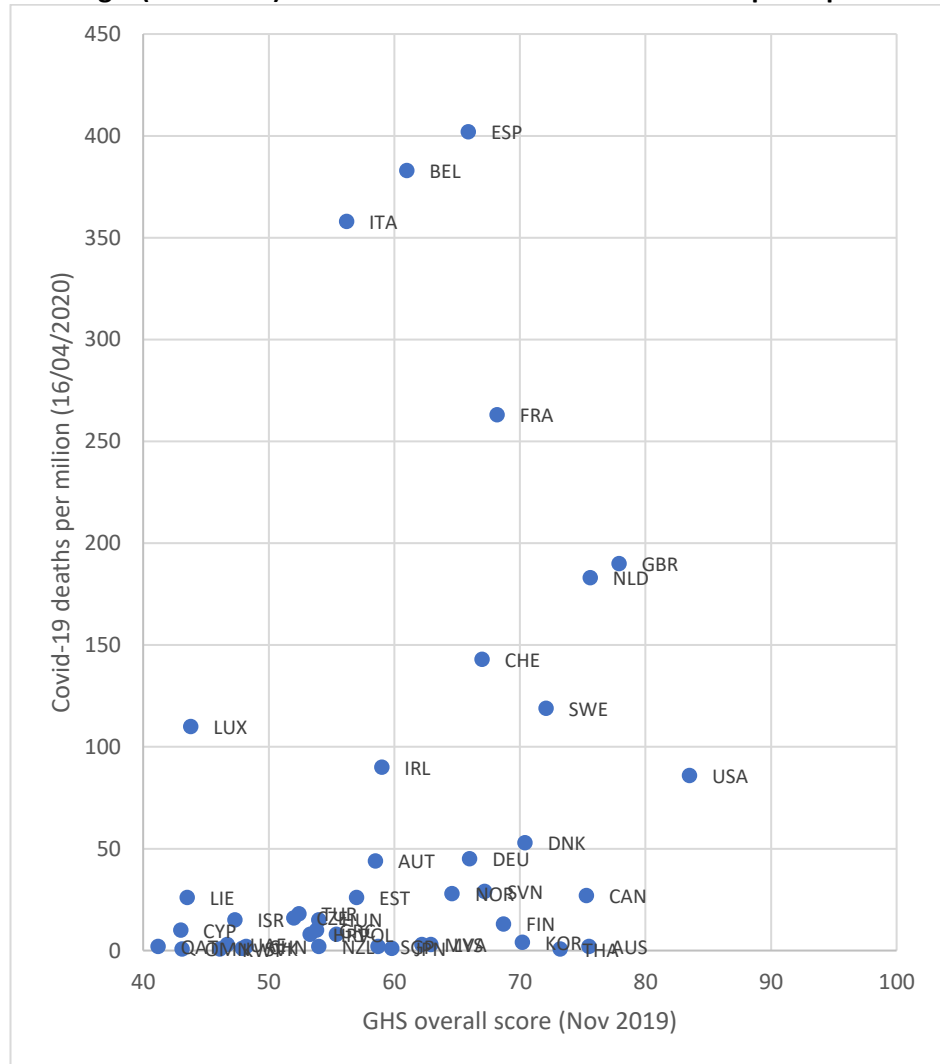


**Fig 3 (continued): GHS overall score vs Covid-19 cases per capita**



Source: Global Health Security Index and Worldometer (16/04/2020)

**Fig 3 (continued): GHS overall score vs Covid-19 deaths per capita**

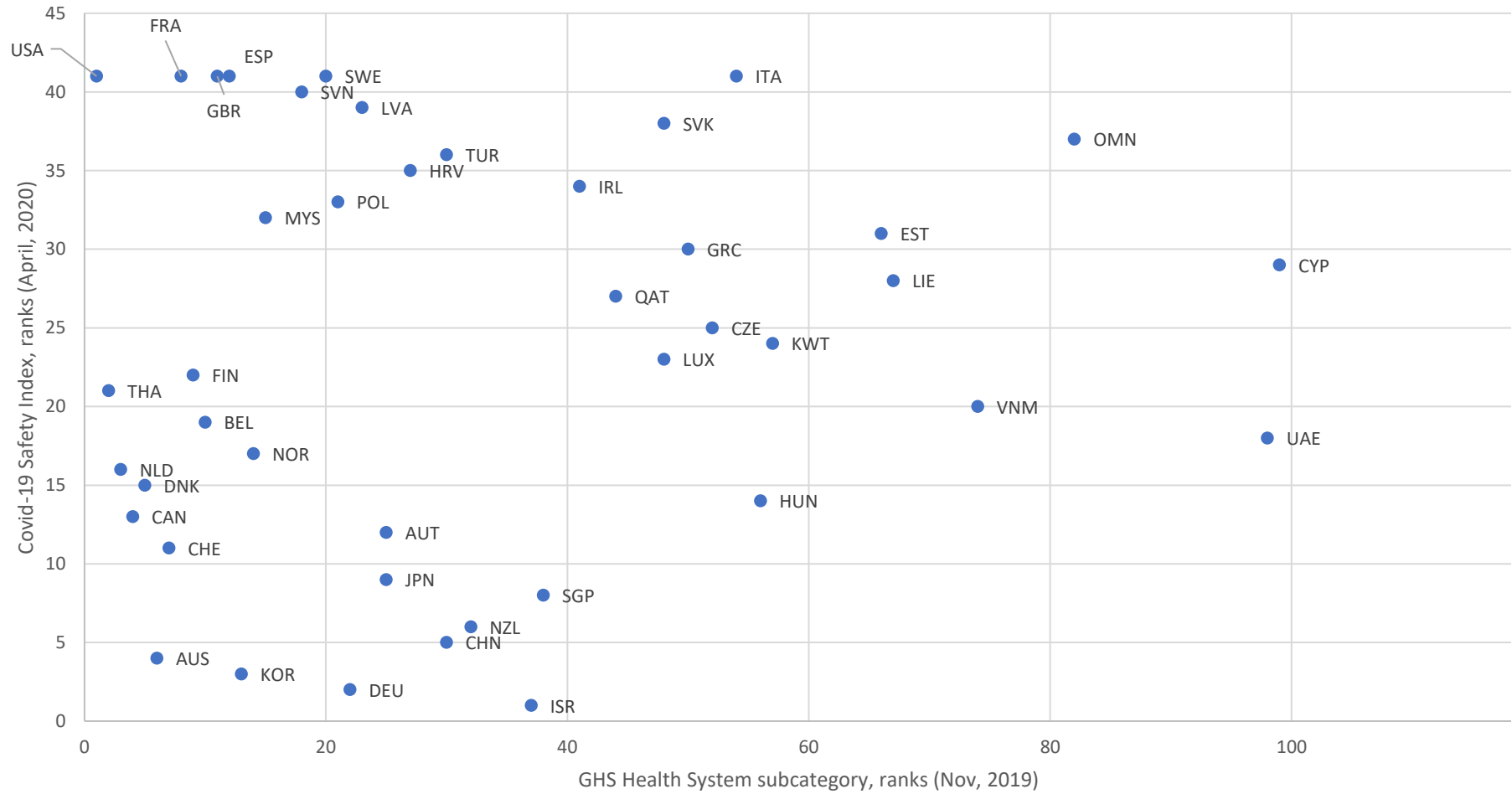


Source: Global Health Security Index and Worldometer (16/04/2020)



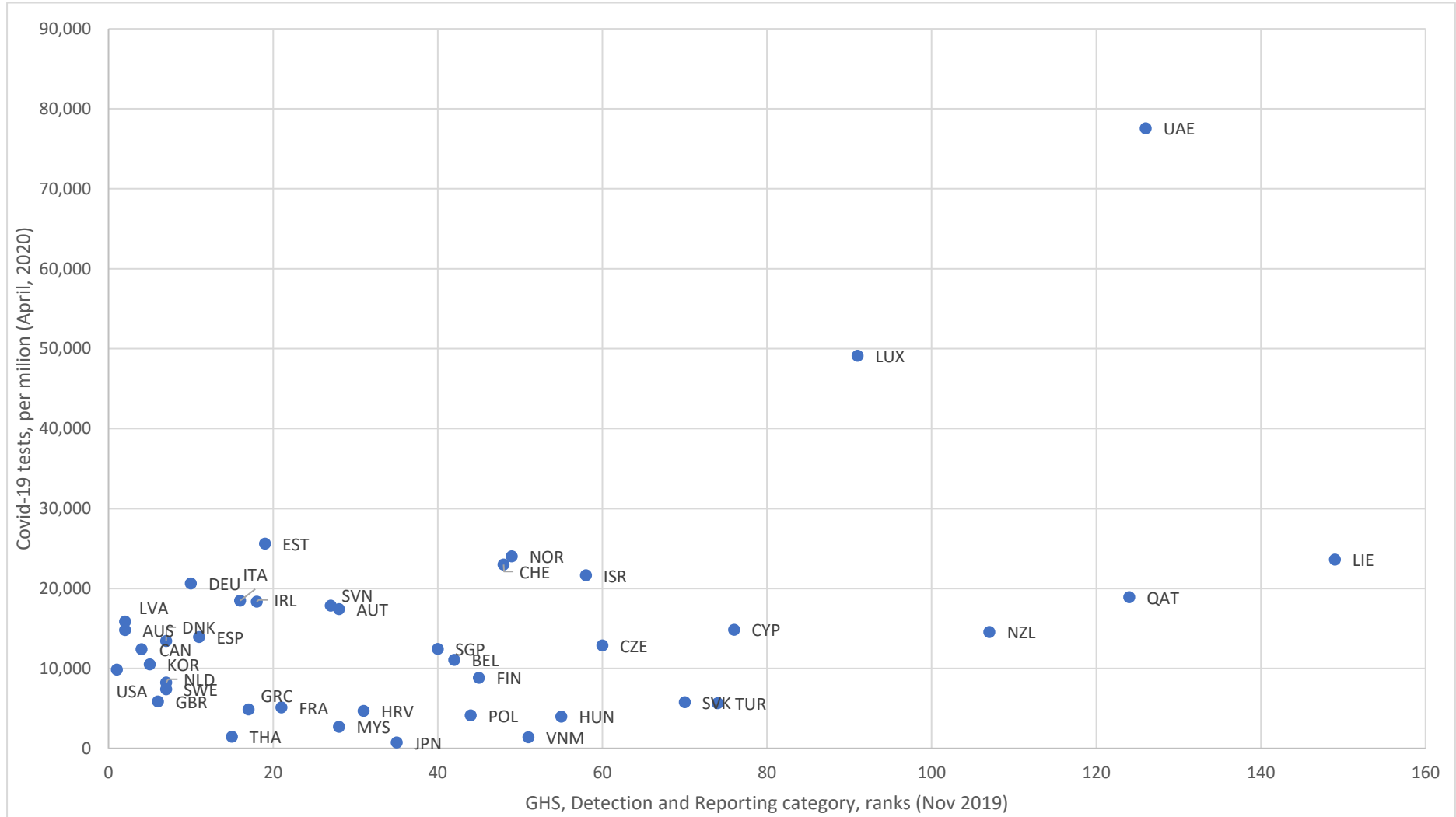


**Fig 4 (continued): GHS Health System vs Covid-19 Safety Index**



Source: Global Health Security Index and Deep Knowledge Group

Fig 5. GHS Detection and Reporting ranks vs total Covid-19 tests conducted per capita



Source: Source: Global Health Security Index and Worldometer (16/04/2020)