

COMPARATIVE ANALYSIS OF BALKAN COUNTRIES' GLOBAL HEALTH SECURITY (GHS) INDEX IN 2019 AND 2021*

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Abstract

International efforts to mitigate biological threats to international health were established in 2005 through the International Health Regulations (IHR), which require states to prevent, detect and respond to emerging infectious diseases. In accordance with this, The Global Health Security (GHS) index was created, which is a very significant indicator of the readiness of 195 countries around the world to respond to the challenges of global epidemics. In this paper, a sample of ten Balkan countries was examined to see if and what impact the COVID-19 epidemic had on the observed countries. Data from 2019 and 2021 were used. Based on the first objective of the research, a comparative analysis of the GHS index and six categories for ten Balkan countries was performed. It was determined that there is no trend of growth or decline in the performance of all countries, neither by category nor when it comes to the overall GHS score. The second objective of the research was to determine whether the epidemic of COVID-19 had an impact on the performance of readiness to respond to the challenges of global health crises, and for this purpose the T-test for dependent samples was used. It was established that there was no decline in performance.

Keywords: *Balkan countries, COVID-19, GHS index*

1. INTRODUCTION

Since the beginning of mankind, society has faced many threats and sources of risk. One of such challenges are epidemics, which in recent years have received many "open doors" due to the internationalization of many processes for the sake of the international products, services and information exchange and transport.

In order to prevent the devastating consequences of epidemics for the population, after the period of Ebola epidemic during 2014-2016, already in 2015 a composite index was created, which has been applied since 2019 (Razavi et al., 2020; Ji, et al., 2021). Namely, in 2019, the Nuclear Threat Initiative, the Johns Hopkins University Center for Health Security and The Economist Intelligence Unit (EIU) published preliminary results for the Global Health Security Index – GHS index (Cameron et al., 2019; Ravi et al., 2020; Alhassan et al., 2023).

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This metric is intended to assess the current state and improve the ability of countries to deal with outbreaks of infectious diseases that could cause serious global damage (Kandel et al., 2020; Bell & Nuzzo, 2021) and as such, these infectious diseases represent a major risk at the international level. The GHS index provides guidelines for prevention, detection and response in international health services. The first publication on this index was published in October 2019.

The latest global epidemic is the COVID-19 virus. This infectious disease of the coronavirus variant has spread rapidly to all continents, confronting countries around the world with numerous challenges and unpreparedness for an adequate response (Lal et al., 2021). After the World Health Organization (WHO) declared the COVID-19 pandemic in March 2020, the virus has infected over 600000000 people and claimed more than 60000000 lives worldwide by 2022 (Alhassan et al., 2023). According to a certain group of authors, this pandemic highlighted the weaknesses of the health systems of countries around the world (Elnaiem et al., 2023).

Based on the literature review, which is presented in more detail in the second section of this paper, it was observed that the largest number of papers deals with the research of cause-effect relationships of the GHS index and other variables on a sample of high ranked countries on the GHS ranking list. Researchers pay less attention to countries that are not highly ranked, or that are not members of the European Union (EU). That's why the attention in this paper is focused on another group of countries that are geographically concentrated in the Western Balkans.

This paper has two main goals. The first goal is to present a comparative analysis of the GHS score of ten Balkan countries in 2019 and 2021 and the second goal is to examine whether in two consecutive reports there have been changes in the willingness of the countries to respond to the challenges and risks brought by global epidemic.

2. LITERATURE REVIEW

By reviewing the literature (Haider et al., 2020; Stribling et al., 2020; Alhassan et al., 2023) it can be seen that the research question is very often asked: Is the GHS index an adequate and representative measure of the readiness of countries around the world to respond to the challenges of epidemics? Namely, numerous studies point to the so-called the phenomenon of the COVID-19 mortality paradox.

Alhassan et al. (2023) investigated the reason why countries, in addition to high GHS index scores, also had a large number of infected with the COVID-19 virus and recorded a high mortality rate. As a reason for the inverse correlation found between these two variables, the authors highlight insufficient compliance as well as insufficient political and internal coordination necessary for a quick response.

The research conducted by Haider et al. (2020) shows that the GHS index is not a representative indicator of the detection of cases infected with the infection of COVID-19. This study emphasized the dynamic growth in the number of patients as the reason for this, as well as the fact that the 2019 report included data related to the pre-COVID period. Mahajan (2021) also states that the index is insufficiently comprehensive in terms of the characteristics of society such as social understandings, education and understanding of the importance of health.

Stribling et al. (2020) investigated the aforementioned mortality paradox in a sample of 36 high-ranking countries according to the value of the GHS index. In this study it was found that the mortality rate was not associated with a high value of the index in the way it was expected.

In one study, the relationship between the number of people tested for the COVID-19 virus and the state's health capacity was examined. A positive, statistically significant correlation

was established between these two variables. In addition to this, the conclusion states that each country has its own gaps and shortcomings when it comes to health security (Maraghi et al., 2020). Similar research was conducted by Boyd et al. (2020), and the conclusion was that investments in health systems have a positive correlation with improving the readiness of countries to respond to the challenges and risks of global pandemics. Also, the authors suggest that future research should investigate the influence of education, health beliefs and the level of well-being on the movement of the GHS index.

Leichtweis et al. (2021) investigated the relationship between recorded cases of infection with the COVID-19 virus and local temperature. It was found that a higher solar radiation index was also associated with a lower degree of spread of the virus. The variable with the greatest explanatory response in the control of COVID-19 was the GHS index, since the countries with the lowest values of this indicator also showed a greater influence of climate variables on the transmissibility of the COVID-19 virus.

Živković and Panić (2021) proposed the inclusion of new variables in the calculation of the GHS index and obtained a confirmed statistically significant new model with a coefficient of determination equal to one.

A review of the literature shows that the GHS index has certain limitations (Ji et al., 2021; Khalifa et al., 2021). Namely, research by a group of authors confirmed the hypothesis that some countries had a higher GHS score, and are struggling more difficult against the COVID-19 epidemic, which indicates that the GHS score of those countries is overestimated, while on the other hand there are countries that are underestimated (Ji et al., 2021). The positive side of this index is that it represents a comprehensive international metric.

The overall conclusion of a number of studies indicates that countries are insufficiently prepared to respond to epidemics (Boyd et al., 2020; Lal et al., 2021; Alhassan et al., 2023).

However, it can be seen that a small number of papers deal with Western Balkan countries and their comparative analysis when it comes to the GHS index. For that reason, it seems that this approach may be worthy of attention.

3. METHODOLOGY

This segment describes the process of data collection as well as the methodology of the GHS index. In order to achieve the predetermined goals of the research, comparative and T-test analysis for dependent samples were applied.

3.1. GHS index methodology

The GHS index provides a broad picture of global health and health security, highlighting where it can be improved by taking into account differences between countries, such as income and population (Razavi et al., 2020). This index is based on existing knowledge and understanding of individual countries' readiness to prevent, detect and respond to infectious disease threats. Data on this index were first published in October 2019 for 195 countries. The GHS Index 2021 is also based on a survey of 195 countries from August 2020 to June 2021. Data were collected through qualitative and quantitative approaches based on publicly available information at the country level (Boyd et al., 2020; Alhassan et al., 2023).

Data on the values of the GHS index for all countries, as well as on the values of groups of indicators and sub-indicators used to calculate the overall GHS score are publicly available data. The six categories of indicators used to measure the GHS index are (Cameron et al., 2019; Ravi et al., 2020):

- Prevention - Preventing the emergence or release of pathogens, including those that pose an exceptional risk to public health in accordance with the internationally recognized definition of a public health emergency of international importance;
- Detection and reporting - Early detection and reporting of outbreaks of potential international significance, which may spread beyond national or regional borders;
- Rapid responses - Rapid response and mitigation of the spread of the epidemic;
- Health system - Sufficient and robust health system for treating the sick and protecting health workers;
- Compliance with international norms - Obligations to improve national capacities, finance plans to eliminate gaps and adhere to global norms; and
- Environmental risk - The general risk environment and vulnerability of the country to biological threats.

Figure 1 shows the structure of the GHS index in 2019 and 2021. As it can be seen, the authors of the GHS index are working on expanding the number of questions and sub-indicators used in order to improve the relevance and precision of the GHS index. Namely, the categories of indicators have remained the same, so the emphasis in this paper is on the six categories of indicators and the overall GHS index.

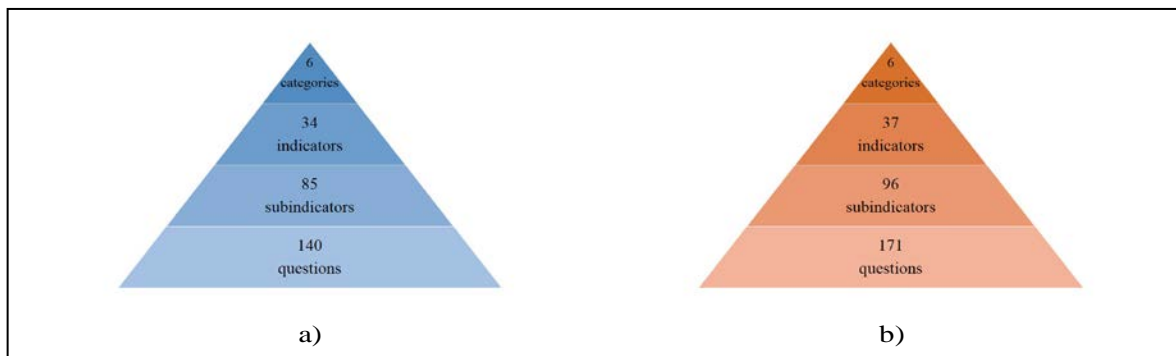


Figure 1. Comparative view of the structure of the GHS index in (a) 2019 and (b) 2021

Source: www.ghsindex.org

3.2. Data collection

Based on the available information on the GHS index of the Balkan countries in 2019 and 2021, an overview of the research data were collected. The data existing in the GHS index reports for 2019 and 2021, which are available on the official website of the GHS index (www.ghsindex.org), was used.

3.3. Comparative analysis

Comparative analysis represents the research of social phenomena using similarities and differences as research instruments (Vuković & Vuković, 2009). Comparative analysis is a methodological framework for better understanding the cause-and-effect relationships involved in the creation of events, characteristics, or relationships, usually by bringing together similar variations in a single variable.

Comparative analysis is used in many situations, such as (Pickvance, 2001):

- Research of theoretically postulated relationships in which social characteristics are the key type of independent variable;

- Examining whether the condition given or established for one company is effective or not; and
- Examining a small number of empirical cases holistically to understand the causal processes that lead to observed similarities and differences.

3.4. T-test for dependent samples

T-test for dependent samples (also known in the literature as T-test of paired samples or T-test of repeated measurements) is used when there is the same group of subjects, i.e. cases (people, companies, states etc). In the t-test for dependent samples, each subject is tested twice in relation to the same variable, ie. a common experiment includes before and after states (Manasijević, 2016). In this case, we are dealing with the GHS index in the pre-COVID period (2019) and the COVID period (2021).

To determine the size of the influence, the eta square indicator (η^2) is used, which is calculated according to the formula (1):

$$\eta^2 = \frac{t^2}{t^2 + N - 1} \quad (1)$$

The following interpretations are used to explain the eta squared indicator (Manasijević, 2016) 0.01 – small impact; 0.06 – moderate impact; and 0.14 – high impact.

4. RESULTS AND DISCUSSION

In this section of the paper, the results of descriptive statistics, comparative analysis and T-test results are presented.

4.1. Results of descriptive statistics

An overview of the descriptive statistics of the observed sample of ten Balkan countries is shown in Table 1.

Table 1: Descriptive statistics of the GHS score of the considered countries

Considered year	Minimum	Maximum	Average	Std. deviation
2019	35.90	68.20	49.35	12.99
2021	35.40	67.80	48.54	9.27

Based on the results shown in Table 1, it can be concluded that the average value of the GHS score in 2019 (49.35) was higher compared to 2021 (48.54), which indicates that, on average, countries had better performance in 2019.

Figure 2 shows a geographical map with the distribution of values from the lowest to the highest value of the GHS index.

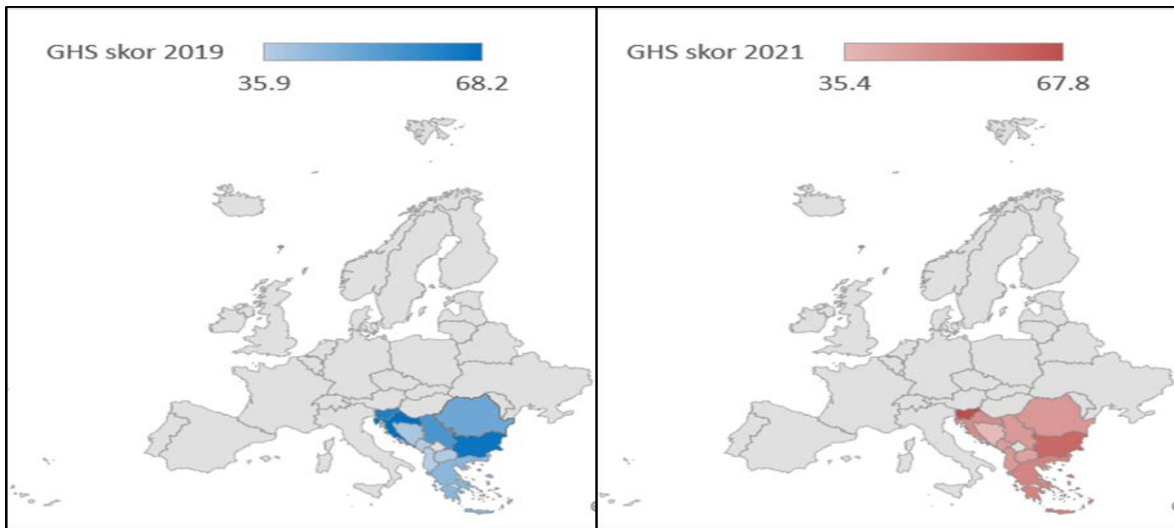


Figure 2. Geographical map with distributions of GHS index values
 Source: author

In 2019, the country with the lowest GHS performance was Albania (35.90), while the best performance was achieved by Croatia (68.20). In 2021, the lowest performance of the GHS index was achieved by Bosnia and Herzegovina (35.40), and the best by Slovenia (67.80).

4.2. Comparative analysis

Figure 3 shows a comparative analysis of the overall GHS score of the Balkan countries in 2019 and 2021.

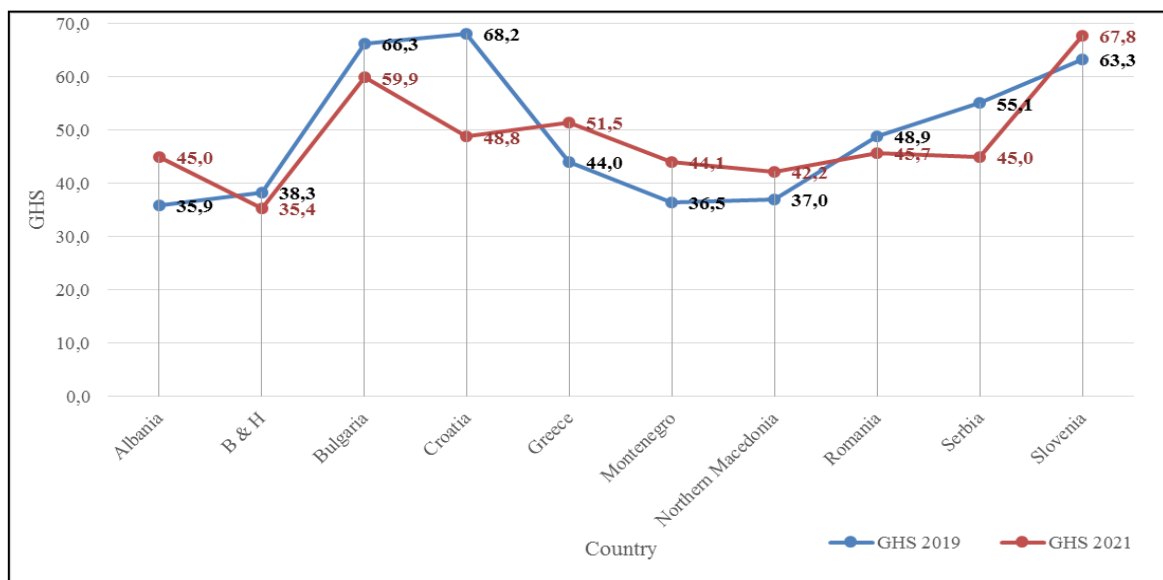


Figure 3. Comparative analysis of the GHS index of the Balkan countries
 Source: author

Based on Figure 3, it can be said that there is no general conclusion that all considered countries that are the subject of interest in this paper have achieved improvement or decline in GHS performance. Some countries have improved their overall GHS performance (Albania, Greece, Montenegro, North Macedonia and Slovenia) while the remaining countries have declined (Bosnia and Herzegovina, Bulgaria, Croatia, Romania and Serbia).

4.3. T-test for dependent samples

In order to examine whether COVID-19 had an impact on the decrease or increase of the average GHS score of the Balkan countries, a t-test for dependent samples was used. The results of this test are shown in Table 2-3.

Table 2: Test of statistics

		Average value	Number of observed countries	Std. deviation	Std. error
Variable	GHS 2019	49.35	10	12.99	4.11
	GHS 2021	48.54	10	9.28	2.94

Table 3: T-test results for dependent samples

	Paired samples					t	df	Sig. (2-tailed)
	Average	Std. deviation	Std. error	95% CI				
				Lower	Upper			
GHS 2019 GHS 2021	-0.81	9.283	2.94	-5.83	7.45	0.276	9	0.789

Based on the results shown in Table 3, it can be concluded that the calculated average value of the GHS score in 2019 (49.35) is slightly higher than the value of the GHS score in 2021 (48.54). On the other hand, based on the results shown in Table 4, it can be concluded that there is a difference in the GHS score for the two observed differences, but that this difference is not statistically significant (Sig = 0.789 > 0.05).

In accordance with this, there is no need to apply formula (1) to calculate the size of the influence of the COVID-19 virus on increasing the average value of the GHS score of the Balkan countries.

Regardless of the fact that the determined average increase in the value of the GHS index in 2021 compared to 2019 is not statistically significant, it is important that the average value is not lower, but on the contrary higher. This speaks in favor of the fact that the readiness of countries to respond to the challenges of global epidemics has not decreased despite the sharp surge of the COVID-19 virus.

5. CONCLUSION

Solutions are constantly evolving in order to resolve the different pandemics, but how countries respond to the pandemic ultimately depends on how resilient their health systems are. The GHS index with its structure can serve as an indicator on which areas of categories, indicators, sub-indicators and groups of issues that make up this index all countries should work on.

In this paper, two research objectives were set. Based on the first objective of the research, a comparative analysis of the GHS index and six categories for ten Balkan countries was performed. It was determined that there is no trend of growth or decline in the performance of all countries, neither by category nor when it comes to the overall GHS score. The second objective of the research was to determine whether the epidemic of COVID-19 had an impact on the performance of readiness to respond to the challenges of global health crises, and for this purpose the T-test for dependent samples was used. It was established

that there was no decline in performance, which is very important from a theoretical point of view.

The mean value of the GHS score in 2019 for the observed sample of countries in 2019 was 49.35, and in 2021 it was 48.54.

However, it is far below the average in both years. Bearing in mind that the highest score of the GHS score that can be achieved is 100.00, and on average in both considered years the mean value of the GHS index was below half of the maximum value (50.00), this indicates the fact that the Balkan countries really need to work on improving their readiness to respond to the risks caused by epidemics.

One of the best strategies for this is preventive planning of stocks of epidemiological equipment and materials for a certain time interval. In support of this, investments in health systems, better regulation and the existence of better legislation in certain countries that are in line with international norms and standards can be significantly beneficial (Boyd et al., 2020; Maraghi et al., 2020; Matijašević & Ditrih, 2021).

KOMPARATIVNA ANALIZA INDEKSA GLOBALNE ZDRAVSTVENE BEZBEDNOSTI (GHS) BALKANSKIH ZEMALJA U 2019. I 2021.

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Izvod

Međunarodni naponi za ublažavanje bioloških pretnji međunarodnom zdravlju uspostavljeni su 2005. godine kroz Međunarodne zdravstvene propise (IHR), koji zahtevaju od država da spreče, otkriju i reaguju na nove zarazne bolesti. U skladu sa tim kreiran je Indeks globalne zdravstvene bezbednosti (GHS), koji je veoma značajan pokazatelj spremnosti 195 zemalja širom sveta da odgovore na izazove globalnih epidemija. U ovom radu je ispitan uzorak od deset balkanskih zemalja kako bi se videlo da li je i kakav uticaj epidemija COVID-19 imala na posmatrane zemlje. Korišćeni su podaci iz 2019. i 2021. godine. Na osnovu prvog cilja istraživanja urađena je komparativna analiza GHS indeksa i šest kategorija za deset balkanskih zemalja. Utvrđeno je da nema trenda rasta ili pada učinka svih zemalja, ni po kategorijama ni kada je u pitanju ukupni GHS skor. Drugi cilj istraživanja bio je da se utvrdi da li je epidemija COVID-19 uticala na performanse spremnosti da se odgovori na izazove globalnih zdravstvenih kriza, a u tu svrhu je korišćen T-test za zavisne uzorke. Utvrđeno je da nije došlo do pada performansi.

Ključne reči: *Balkanske zemlje, COVID-19, GHS indeks*

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