Towards sustainable development goal 3:
The case of the Balkan countries

Nuray Tezcan

Haliç University
Faculty of Business Administration,
Department of Management
Information Systems,
Istambul, Turkey
E-mail: nuraytezcan@halic.edu.tr

The Sustainable Development Goal 3 framework, released by the United Nations in 2015, includes 27 targets to be achieved by 2030. Consequently, tracking of countries has gained importance in order to determine progress and take corrective actions. The aim of this study was to measure the performance of 11 Balkan countries with respect to Sustainable Development Goal 3 and determine the progress of these countries during the period 2010–2019.

To measure the performance of the countries for the years 2010, 2015, and 2019, the entropy-based TOPSIS method, which is a widely used multi-criteria decision-making method, was used. The study analysed 14 available health indicators. Based on the performance scores obtained from the analyses, Greece, Slovenia, and Croatia were determined to be the first three successful countries, while Romania and Bulgaria were the worst performers during this period. This study found that despite improvements in some indicators, more attention should be paid to achieving targets such as deaths and injuries from road traffic accidents, suicide mortality rates, and prevention of communicable and non-communicable diseases.

Introduction

In recent years, the achievement of the Sustainable Development Goals (SDGs) declared by the United Nations (UN) has been a priority for countries throughout the world. For this reason, the progress shown by countries has been monitored through various reports and indices released by related institutions every year. Accordingly, the results have been taken into account, and corrective actions have been fulfilled by countries to meet the goals' targets. Among the 17 SDGs, Sustainable Development

Goal 3 (SDG3) has been devoted to health and defined as 'ensure healthy lives and promote well-being for all at all ages'. There are 13 targets and 28 indicators, some of which are related to child and maternal health, ending communicable and non-communicable diseases, preventing deaths from road traffic accidents, and achieving universal health coverage. A list of targets to be achieved by 2030 is provided in Table A1 of the Appendix.

Balkan countries[1] (BC) have drawn attention because of their geographical proximity to well-developed European countries, and this region can be regarded as a bridge between Asia and Europe. For this reason, monitoring BC with respect to SDGs has gained great importance for both other countries and related institutions. In fact, there is no agreement in the literature on which countries can be considered Balkan. However, Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Greece, Kosovo, Montenegro, North Macedonia, Romania, Serbia, Slovenia, and Turkey can be referred to as BC, as they are entirely or partially located on the Balkan Peninsula [1].

With the Covid-19 pandemic, which has spread worldwide in the last two years, the importance of the existence of a strong health system has been understood once again, and achieving health targets in SDGs has become more important than ever. With this point of view, the purpose of this study is to evaluate the performance of the BC with respect to SDG3 and determine the progress of the countries during the 2010-2019 period. By monitoring the progress of the countries, it might be possible to gain perspectives on whether they will meet these targets by 2030.

The remainder of this study is organised as follows. The second part of the study is dedicated to a literature review, and the third part provides information about some features of the countries. The variables, data sources, and methods are discussed in the next section. After providing the results of the analyses, discussions and concluding remarks are presented in the last section.

Literature review

Numerous studies have examined the status of SDG3 indicators regarding BC in the existing literature. Some studies include all BC cases, while others deal with Western Balkan countries (WBC). In this section, examples from these studies are presented.

Tresa et al. (2017) examined the effects of the Europeanisation process on the levels of alcohol consumption in the Western Balkans (Albania, Montenegro, Serbia, Bosnia and Herzegovina, North Macedonia, and Croatia) from 1991 to 2011. According to these results, there was an increase in wine and beer consumption; therefore, new policies should be implemented to prevent alcohol-related diseases. Levy et al. (2018) investigated the potential effects of strong tobacco control policies

---

[1] This study aimed to be comprehensive and therefore analyzed as many BC as possible. Therefore, Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Greece, Montenegro, North Macedonia, Romania, Serbia, Slovenia, and Turkey were included in this study while Kosovo was not included due to lack of data.

on health in 11 South-eastern European countries (Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Israel, Montenegro, Moldova, Romania, Serbia, Slovenia, and North Macedonia) based on the WHO Framework Convention on Tobacco Control (WHO FCTC). The results show that when countries implement all six tobacco control measures, smoking prevalence can decrease by about 30% in the next 15 years. A recent study by Ili´c et al. (2022) examined the prevalence and risk factors of cigarette smoking among Western Balkan (Slovenia, Croatia, Bosnia and Herzegovina, North Macedonia, and Serbia) medical students. There were significantly more non-smokers than smokers among the medical students. Only gender and parents' smoking status were significantly associated with students' smoking status. The smokers were more often male students who lived in urban areas prior to their studies, and whose parents were smokers.

Radević et al. (2018) studied socioeconomic inequalities in the prevalence of non-communicable diseases in Serbia based on the 2013 National Health Survey. They concluded that socioeconomic inequalities in health status are a major challenge, and these problems should be solved through national health policies in Serbia. Another study conducted by Dimitrova et al. (2020) compared the differences in breast cancer therapy and healthcare service activities in Albania, Bosnia and Herzegovina, Bulgaria, Kosovo, Montenegro, North Macedonia, Croatia, Romania, Slovenia, and Serbia. According to their findings, there are differences and inequalities in the provision of breast cancer health services in Central and Eastern European countries. For this reason, some improvements should be made to the health policies of these countries. In addition, Vekic et al. (2020) found that economic factors can affect the five year prevalence of colorectal cancer, and there is a positive relationship between the gross domestic product (GDP) per capita levels and colorectal cancer incidence rate and prevalence in 11 BC.

Hukic et al. (2015) and Arapovic et al. (2019) investigated the reasons for measles outbreaks in Bosnia-Herzegovina during 2014–2015 and 2019, respectively. They determined that low vaccination coverage is one of the most important reasons; therefore, vaccination coverage should be increased to prevent future measles outbreaks.

Antczak–Zaidi (2018) examined the well-being status of the older population in eight Eastern European countries, namely, Albania, Armenia, Georgia, Moldova, Montenegro, Serbia, Turkey, and Ukraine, and compared these countries to eight other European Union (EU) member states of the same region using the Global AgeWatch Index. The results show that the countries in the first group have lower index values than those in the second group. Another result is that the population has been aging, and countries need to make some arrangements in their health policies to prepare for this.

Overview of the health and economic indicators in Balkan countries

BC differ in terms of both political stability and economic conditions. In particular, WBC[2] experienced transitions for reasons such as religion, ethnicity, or economic crises in the 1990s. Among these transitions, the breaking up of former Yugoslavia[3] in the early 1990s had a strong impact on WBC. In Sarajevo, during 1992-1993, more than half of the deaths were caused by the ongoing civil war, and the incidence of infectious diseases increased because of unhealthy conditions (Kunits 2004). In addition, the bombing of Serbia due to the Kosovo conflict in the late 1990s was another incident (Kunits 2004, Eikemo et al. 2009). Accordingly, thousands of people died, millions of people were affected by these transitions, and countries faced great difficulties in all areas. From an economic perspective, there was a general improvement in macroeconomic indicators during the 2001-2008 period in WBC; after this period, with the effect of global crises, some countries experienced a deep recession and GDP growth decreased (Uvalic–Cvijanovic 2018). Despite these difficulties experienced during the last decade, WBC as a whole can be seen as a group of remarkable countries for investors. The existence of candidate countries for EU membership, strategic geographical location, diversified economies, favourable tax regimes, well-educated populations, and low labour costs are the most important features of the region (Sanfey et al. 2016). Other countries in this region, Croatia and Slovenia, had higher GDP per capita levels compared to other WBC during the 1990s (Kunits 2004).

Some characteristics of all BC included in this study are presented in Table 1. Life expectancy at birth, annual population growth, and the population aged 65 and above are given as average values. Moreover, the ranks based on the SDGs 2021 Index and the status of the countries regarding EU membership and income level are shown in Table 1.

Based on the average values calculated, Greece had the highest value, whereas Bulgaria had the lowest life expectancy at birth, which is one of the most important mortality indicators. Population growth was negative in seven out of 11 countries. Regarding the share of people aged 65 and over, Greece had the highest rate, while Turkey the lowest, and this indicator was lower than that of the EU23 for most countries. Moreover, the value of this indicator has increased in all countries over the last decade, including Eastern European countries (Kulcsar–Brown 2017). Both the increase in the elderly population and the negative population growth caused one of the most important problems to be solved in the Balkans [6].

[2]According to the European Commission's terminology, Albania, Bosnia and Herzegovina, Kosovo, Montenegro, North Macedonia, and Serbia are referred as WBC. At the same time, some studies add Croatia to this list [2].

[3] The former Yugoslavia comprised of six present-day nations, namely Bosnia and Herzegovina, Croatia, Montenegro, Macedonia, Slovenia, and Serbia before the breaking-up.

Table 1

Some specific characteristics of the Balkan countries

Countries	Life expectancy at birth, total (years)	Population growth (annual %)	Population ages 65 and above (% of total population)	SDG 2021 index rank (out of 165 country)	EU membership	Income level
	2010–2019					
Albania	77.77	–0.25	12.60	64	Candidate country	Upper middle
Bosnia-Herzegovina	76.76	–1.24	15.23	47	Potential candidate	Upper middle
Bulgaria	74.54	–0.65	19.92	45	Member	Upper middle
Croatia	77.44	–0.57	19.32	14	Member	High
Greece	81.19	–0.35	20.73	37	Member	High
Montenegro	76.22	0.06	14.05	85	Candidate country	Upper middle
North Macedonia	75.30	0.13	12.77	54	Candidate country	Upper middle
Romania	74.85	–0.50	17.19	39	Member	Upper middle[a]
Serbia	75.23	–0.53	16.91	34	Candidate country	Upper middle
Slovenia	80.66	0.24	18.34	9	Member	High
Turkey	76.25	1.57	7.96	70	Candidate country	Upper middle
BC11[b]	76.93	–0.19	15.72			
EU23[c]	79.89	0.36	17.80			

a) Based on new thresholds (for gross national income (GNI) per capita in current USD, Atlas method) and as of July 1, 2021, Romania moved to the lower category [7].

b) BC11 indicates the BC examined in this study.

c) This calculation includes EU member states except Bulgaria, Greece, Croatia, Romania and Slovenia. In addition, the UK withdrew from the EU as of January, 31, 2020. Since the data used is from before 2020, the UK was included in the calculations. Also, Croatia joined the EU in 2013, and therefore the number of countries is 27 before this year.

Source: Compiled by the author based on [3], [6], and Sachs et al. (2021).

According to the Sustainable Development Goal (SDG) Index 2021 released by Cambridge University, among the BC, Slovenia had the best score, while Montenegro had the worst. On the other hand, five out of 11 were member states in the EU, and all BC were included as either high-income or upper-middle-income groups.

Table 2

Average values for health expenditure and GDP growth during the 2010–2019 period

Countries	Current health expenditure (% of GDP)	Current health expenditure per capita, PPP (current international USD)	GDP growth (annual %)	GDP per capita, PPP (current international USD)[a]
Albania	5.06	575.58	2.59	11,619.77
Bosnia-Herzegovina	9.21	1,126.77	2.05	12,154.53
Bulgaria	7.36	1,391.71	2.08	18,874.55
Croatia	7.10	1,695.97	1.15	24,187.35
Greece	8.43	2,305.36	−2.09	27,395.83
Montenegro	8.34	1,462.11	2.88	17,101.47
North Macedonia	6.60	930.36	2.64	14,020.42
Romania	5.18	1,202.42	3.11	22,841.15
Serbia	8.92	1,373.46	1.95	15,370.58
Slovenia	8.50	2,816.42	1.92	32,834.91
Turkey	4.39	1,045.07	5.86	23,965.04
BC11	7.20	1,458.70	2.19	20,033.24
EU23	8.57	3,644.75	2.42	42,003.98

a) GDP growth and GDP per capita indicators for 2020 were not included in the calculation of averages as this year included the negative effects of the Covid-19 pandemic.

Source: Compiled by the authors based on [6].

In addition to the features listed in Table 1, the economic and health indicators calculated for each country are presented in Table 2. Although BC have belonged to either high-income or upper-middle-income groups in the last decade, when they are compared with the EU23 average regarding health expenditure indicators, it can be seen that they lag behind European countries. Based on the World Bank (WB) world development indicators (WDI) database, as shown in Table 2, the average value of current health expenditure as a percentage of the GDP remains at approximately 8.5% in EU countries, whereas in the BC group, this indicator remains at 7.2% between 2010 and 2019 [6]. Additionally, the current health expenditure per capita has been about 3600 USD in the EU, whereas it has been about 1500 USD in BC in the last decade. In other words, health expenditure per capita is approximately more than two times higher in the EU than in the BC. In fact, there are different regions in Europe in terms of their health status. One of the main reasons for these regional disparities in health status is the socioeconomic differentiation among the countries (Egri 2017).

As can be seen from the same table, while Greece has a negative growth rate, its health expenditure as a share of GDP is above 8%. On the other hand, despite Turkey having the highest growth rate, its health expenditure as a share of GDP is the lowest among the countries.

Data and methods

The SDGs framework includes a total of 231 indicators and 28 of 231 belong to SDG3 which has the highest number of indicators among goals [4]. The data regarding health indicators are provided from the UN SDGs dataset [5], while other indicators relating to the economy and population are obtained from [6]. The main limitation of this study was the existence of missing data. When the different databases were examined regarding data released in the past decade, it can been seen that health indicators included in the SDG3 framework either do not exist or are calculated for only some countries or for only certain years. Therefore, it is not possible to analyse these countries for consecutive years using this data. The year 2010 was included in the analysis process in order to examine prior and post 2015, and thus provide an opportunity to compare the two periods. As a result, 2010, 2015, and 2019 were considered because the most comprehensive and updated datasets have been provided for these years. Additionally, because there is a difference among countries in terms of population size, only indicators stated as a percentage or per capita were included, whereas indicators with absolute numbers were excluded from the analysis. At the end of the process, 14 common indicators were determined for the years 2010, 2015, and 2019 for the 11 BC. The indicators used in this study are listed in Table 3.

Table 3

Health indicators used in determining health performance

Indicator number	Indicators
3.1.1	Maternal mortality ratio (per 100,000 live births)
3.2.1	Infant mortality rate (deaths per 1,000 live births)
3.2.1	Under-five mortality rate, by gender (deaths per 1,000 live births)
3.2.2	Neonatal mortality rate (deaths per 1,000 live births)
3.3.2	Tuberculosis incidence (per 100,000 population)
3.4.1	Mortality rate attributed to cardiovascular disease, cancer, diabetes, or chronic respiratory disease (probability)
3.4.2	Suicide mortality rate, by gender (deaths per 100,000 population)
3.5.2	Alcohol consumption per capita (aged 15 years and older) within a calendar year (litres of pure alcohol)
3.6.1	Death rate due to road traffic injuries (per 100,000 population)
3.7.2	Adolescent birth rate (per 1,000 women aged 15-19 years)
3.8.1	Universal health coverage (UHC) service coverage index
3.9.3	Mortality rate attributed to unintentional poisonings, by sex (deaths per 100,000 population)
3.b.1	Proportion of the target population with access to three doses of diphtheria-tetanus-pertussis (DTP3) (%)
3.b.1	Proportion of the target population with access to measles-containing-vaccine second-dose (MCV2) (%)

To measure the performance of BC with respect to SDG3, the Technique for Order Preference by Similarity to Ideal Solution (TOPSIS), which is a multi-criteria decision making method frequently used in the literature, is employed. In this method, numerous criteria (indicators) that conflict with each other can be analysed simultaneously; at the end of the process, a performance score between 0 and 1 is obtained for each alternative, and these alternatives can be ranked based on these scores from highest to lowest. An alternative that has the highest score is assumed to be the best performer (Hwang–Yoon 1981). After constructing a decision matrix which includes m alternatives and n criteria (indicators), the following steps can be applied:

- Step 1: Decision matrix is normalized through vector-normalization method.
- Step 2: The weighted normalised decision matrix is constructed by multiplying the normalised matrix and weights.
- Step 3: The positive ideal solution and negative ideal solution are determined based on the optimisation of the criteria.
- Step 4: For each alternative, the distance from the positive ideal solution to the negative-ideal solution is calculated.
- Step 5: For each alternative, the closeness coefficient is calculated using positive and negative ideal solutions.
- Step 6: The rank values of the alternatives were determined by comparing the closeness coefficient values.

Before starting the analysis, a weight should be assigned to each criterion to perform the TOPSIS method (Dobos et al. 2021, Ghalehteimouri et al. 2021). As a common method, the equal weight approach can be used; however, the contributions of some indicators in the dataset may be different. Numerous methods have been reported to reveal these differences. In particular, when the number of criteria is large, the entropy method can be used to prevent subjective evaluations by the researcher (Zeleny 1974). In this study, the entropy method was used to ensure objectivity in determining the weights of criteria. This method can be defined as a measure of observational variety and is also assumed to be a nonparametric measure of diversity because it has no assumption about the nature of the frequency distribution (Krippendorff 1986).

Results

The TOPSIS method was used to measure the performance of the BC, and countries were ranked based on these scores. For this purpose, weights were first calculated for the years 2010, 2015, and 2019 using the 14 indicators. To compare the years objectively, a common weight was obtained by taking the average of the values, and this average was used in the TOPSIS method. Table 4 lists the weights calculated as follows.

Table 4

Weights calculated by entropy method

Indicator number	2010	2015	2019	Common weight
3.1.1	0.1060	0.0800	0.0716	0.0859
3.2.1	0.0777	0.0754	0.0660	0.0731
3.2.1	0.0769	0.0735	0.0640	0.0715
3.2.2	0.0574	0.0807	0.0787	0.0723
3.3.2	0.1948	0.1958	0.1970	0.1959
3.4.1	0.0158	0.0179	0.0230	0.0189
3.4.2	0.1001	0.1011	0.0991	0.1001
3.5.2	0.0552	0.0501	0.0505	0.0520
3.6.1	0.0284	0.0263	0.0288	0.0278
3.7.2	0.1004	0.1163	0.1344	0.1171
3.8.1	0.0040	0.0030	0.0025	0.0032
3.9.3	0.1815	0.1776	0.1798	0.1796
3.b.1	0.0003	0.0009	0.0023	0.0012
3.b.1	0.0014	0.0014	0.0021	0.0016

Source: Constructed by the author based on entropy.

In line with the results of the entropy method, the tuberculosis incidence indicator has the highest weight; therefore, it can be regarded as the most important indicator. The mortality rate attributed to unintentional poisonings indicator has the second highest weight and adolescent birth rate has the third highest weight. Indicators of vaccination rates and universal health coverage had the lowest weights. After the weights were determined, the TOPSIS method was applied. Table 5 presents the ranks of the countries based on their performance scores for the years 2010, 2015, and 2019.

Table 5

Ranks of the countries based on performance scores

| Countries	2010		2015		2019	
	Score	Rank	Score	Rank	Score	Rank
Albania	0.7504	5	0.7565	4	0.7270	7
Bosnia-Herzegovina	0.7089	8	0.6664	9	0.7040	9
Bulgaria	0.6097	10	0.5937	10	0.6462	10
Croatia	0.7939	3	0.7933	3	0.8099	3
Greece	0.9333	1	0.9158	1	0.9116	1
Montenegro	0.7504	5	0.7410	5	0.7329	6
North Macedonia	0.7712	4	0.7059	7	0.7883	5
Romania	0.1189	11	0.1469	11	0.1560	11
Serbia	0.7216	7	0.7369	6	0.7940	4
Slovenia	0.8100	2	0.7946	2	0.8220	2
Turkey	0.6814	9	0.7021	8	0.7196	8

Source: Constructed by the author based on results of TOPSIS analysis.

As can be seen in Table 5, Greece had the highest score, Slovenia had the second highest, and Croatia had the third highest in 2010, while Bulgaria and Romania had the lowest scores. Additionally, the score difference between Greece and Slovenia was larger than the score difference between Slovenia and Croatia. This ranking was maintained for 2015 and 2019. The order of the other countries exhibits the same pattern for 2010, 2015, and 2019, although there are some differences.

When the scores of the countries were examined across the years, Bulgaria, Croatia, Romania, Serbia, Slovenia, Turkey, and North Macedonia increased their scores while the scores of Albania and Montenegro decreased. The scores of Greece and Bosnia-Herzegovina remained almost the same. Unlike other countries, the ranks of Albania and Serbia have changed remarkably. Figure 1 displays the changes in the performance scores of the BC during the 2010–2019 period.

Figure 1

Performance scores of the Balkan countries
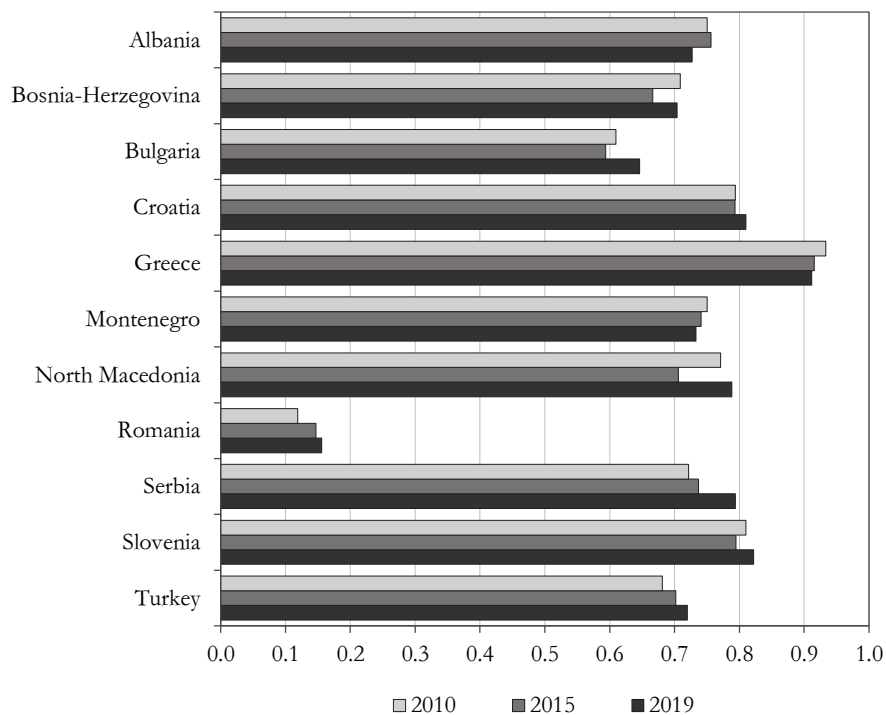
Source: Constructed by the author based on results of TOPSIS analysis.

The result that is most striking in light of the findings obtained is that even as the years continued, the order of the countries remained almost the same. In addition, Romania had a very low performance score compared with other countries. It should

be noted that when the TOPSIS method was repeated with equal weights for each indicator, very similar results were obtained.

Discussion

This study aims to measure the performance of BC with respect to SDG3 based on indicators given in the SDG framework and determine the progress of the countries during the 2010–2019 period. In fact, BC are located in wealthy regions of Europe and bordered by developed European countries.

According to the World Bank's taxonomy, all countries included in this study are either upper-middle income or high-income countries, but development levels differ across the region when compared to the EU average, especially WBC (Albania, Bosnia and Herzegovina, Kosovo, Montenegro, North Macedonia, and Serbia), which have lower GDP per capita levels. One of the important reasons for this was the transition period that occurred during the 1990s. As a result of this, approximately 25% of the population has left the region in the past two decades (Matkovic 2017, Costantini et al. 2015, Rancic et al. 2015).

On the other hand, life expectancy at birth, one of the most important mortality indicators, has increased from 75.86 to 77.64%, while the share of people aged 65 and over has increased from 14.39 to 15.72 in the last decade in the BC [6]. Therefore, more attention should be paid in this region to health policies regarding the diagnosis and treatment of chronic diseases as well as the training of health workers in elderly care.

In this study, the relationship between GDP growth and health expenditure as a share of GDP was analysed using the Spearman rank correlation coefficient, as the sample size was small. Unlike the findings of Stepovic et al. (2020), there was no relationship between GDP growth and health expenditure as a share of the GDP and health expenditure per capita indicators between 2010 and 2019 in the BC. This result supports the findings of Xu et al.'s (2011) study and indicates that economic development does not always support development in the area of health.

In the analysis process of this study, the weights used in the TOPSIS method were determined using the entropy method. Accordingly, the tuberculosis incidence indicator had the highest weight among the indicators; therefore, it can be regarded as the most important indicator in determining health performance. The values ranged from 4.7 and 104 in 2010, 4.4 and 82 in 2015, and 4.7 and 66 in 2019. On the other hand, the indicator of mortality rate attributed to unintentional poisonings had the second highest weight, and adolescent birth rate had the third highest weight.

With respect to performance scores obtained using the TOPSIS method, Greece, Slovenia, and Croatia were the top three performers in the Balkans, whereas Turkey, Bosnia Herzegovina, Bulgaria, and Romania had the lowest scores in all years. This result is consistent with the existing knowledge regarding the health status of these

countries (Mackenbach–McKee 2013). The common features of the best performers are being high-income countries and members of the EU.

In this study, some countries were remarkable in terms of some indicators. For instance, despite Greece having negative values in economic growth, it is one of the leading countries with higher values in terms of health expenditure per capita and health expenditure as a share of GDP. In addition, it had the highest performance score, with a clear lead for all years. The main reason for this situation is that Greece is better in terms of indicators with the highest weights in the analysis. On the other hand, it should be taken into consideration that the values of the suicide mortality rate and alcohol consumption per capita indicators have increased from 2010 to 2019 in Greece. Table A2 in the Appendix presents the values of the indicators.

Romania presents an interesting case. It has a high income level and is an EU member country; however, it has one of the lowest levels of health expenditure as a share of GDP and health expenditure per capita, and the health indicators in this country are worse than those in other countries. According to a recent study by Lazar–Litan (2022), despite some improvements in well-being scores in Romania from 2006 to 2017, the economic growth rate varied from one district to another, and well-being scores were below the country level in most districts. Unlike Greece, Romania had the lowest performance score among the countries for all years in this study. A similar finding was reported in a study conducted by Gabriel–Mihaela (2012). One of the main reasons for this situation is that Romania has worst indicators with the highest weights in the analysis. Radu et al. (2022) highlighted that the adolescent birth rate is growing, and Romania ranks first in the EU in the number of children born by mothers under the age of 15. Another study highlighted brain drain in the health sector and suggested that public policies can be used as a tool, and systematic solutions should be used instead of specific solutions (Apostu et al. 2022). Moreover, in terms of sustainable development, Romania ranked 30th out of 31 countries in the Europe Sustainable Development Report 2020 which evaluated EU member states and partner countries with regard to SDGs (SDSN-IEEP 2020), and furthermore ranked 31st out of 34 countries in the Europe Sustainable Development Report 2021 (Lafortune et al. 2021).

Another interesting case is Turkey, which has the largest population among all the countries. In Turkey, the population growth rate has been at the highest level during the last decade, and the rate of people aged 65 and over is the lowest compared with other countries. In addition, contrary to the top performers in the BC, it has the highest level of economic growth. However, it is one of the countries that need substantial improvements in terms of health expenditure as a share of the GDP and health expenditure per capita indicators. This finding confirms the results of Lorcu et al.'s (2012) study. A recent study conducted by Tezcan (2020) investigated Turkey's performance in terms of various health indicators between 2013 and 2018, using the TOPSIS method. The findings indicate that, although there is an increasing trend in this period, it is clear that this improvement is not at a sufficient level.

In addition, it should be noted that BC has already achieved certain numerical targets. According to the official SDGs targets, the maternal mortality ratio should be less than 70, the under-five mortality rate should be less than 25, and the neonatal mortality rate should be less than 12 until 2030. When the values in the dataset given in Table A2 of the Appendix are examined, it can be seen that all countries have achieved these targets in the course of the past decade; however, there have been large differences that should be closed as soon as possible across countries.

On the other hand, the indicators 3.3.2, 3.4.1, 3.4.2, and 3.5.2, 3.6.1, and 3.7.2, provided in Table A1 of the Appendix should be observed carefully in terms of numerical targets because they could not meet expectations. Despite some improvements, it was found that these changes were not at a sufficient level; moreover, alcohol consumption increased. Apart from Target 3.6, that halves the number of global deaths and injuries from road traffic accidents by 2020, none of the countries have shown progress between 2010 and 2019, except Montenegro. Moreover, the value of this indicator has almost doubled in Turkey instead of decreasing. In addition, in most countries, vaccination rates declined between 2010 and 2019.

Since early 2020, millions of people have been affected in different ways throughout the world because of the Covid-19 pandemic. Many people avoided going to hospitals because of the fear of being exposed to the pandemic and cancelled or postponed their hospital visits. On the other hand, healthcare services could not be met properly in hospitals or healthcare facilities because of the lack of healthcare workers or medical equipment (UN 2020). Moreover, the pandemic has caused a decrease in life expectancy even in high-income European countries. However, the real effect of the pandemic is not yet known, because many health indicators are not available for 2020 (Sachs et.al 2021). With the Covid-19 pandemic, we experienced the importance of strong health systems, and the necessity of well-educated health workers has been understood. It is expected that these experiences will negatively affect the achievement of health targets.

Conclusion

This study represents the first attempt to evaluate the performance of Balkan countries with respect to SDG3 using the TOPSIS method. However, this study has several limitations. First, some indicators have been calculated for only some countries or have not yet been produced. Second, health indicators released by several institutions belong to different years; therefore, it is not possible to gather comprehensive data for each year and for all countries. Therefore, it is not possible to obtain a trend line using consecutive years. Third, to enable comparisons among countries, only indicators given as percentages are included because of different population sizes. Finally, it should be noted that the results and ranking may change

when the evaluation method and weights of the indicators are changed. The countries included in this study differ in some respects. For this reason, Western Balkan countries, due to their similarities, can be analysed as a separate study. Moreover, different multi-criteria decision-making or weighting methods can be used in further research.

This study focuses on the performance of the Balkans with respect to SDG3. In line with these findings, countries improved their SDG3 performance between 2010 and 2019, except for Albania and Montenegro. Greece, Slovenia, and Croatia were the best performers, whereas Romania had the worst performance. This result indicates that Romania requires substantial improvements regarding its health policies. Moreover, despite Turkey and Romania having a higher GDP growth rate than other BC, health expenditure as a percentage of the GDP and health expenditure per capita levels of these countries are at the lowest level in the BC. This situation indicates that governments do not allocate sufficient resources to the health field.

Consequently, despite some targets being achieved, more effort should be made regarding deaths and injuries from road traffic accidents, suicide mortality rates, alcohol consumption per capita, and prevention of communicable and non-communicable diseases. These indicators should be observed carefully because they do not meet expectations. Based on the analyses, it is observed that the improvement in some indicators is not at a sufficient level. It is clear that the health systems of countries throughout the world have been affected by the Covid-19 pandemic, and removing the negative effects of the pandemic will take a long time. From this point of view, even though countries will improve their performance in the following years, whether they will achieve targets entirely by 2030 is still unclear.

Appendix

<div align="right">Table A1</div>

SDG 3. Ensure healthy lives and promote well-being for all at all ages

3.1 By 2030, reduce the global maternal mortality ratio to less than 70 per 100,000 live births

3.2 By 2030, end preventable deaths of newborns and children under 5 years of age, with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1,000 live births and under-5 mortality to at least as low as 25 per 1,000 live births

3.3 By 2030, end the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases and combat hepatitis, water-borne diseases and other communicable diseases

3.4 By 2030, reduce by one third premature mortality from non-communicable diseases through prevention and treatment and promote mental health and well-being

3.5 Strengthen the prevention and treatment of substance abuse, including narcotic drug abuse and harmful use of alcohol

3.6 By 2020, halve the number of global deaths and injuries from road traffic accidents

3.7 By 2030, ensure universal access to sexual and reproductive health-care services, including for family planning, information and education, and the integration of reproductive health into national strategies and programmes

3.8 Achieve universal health coverage, including financial risk protection, access to quality essential health-care services and access to safe, effective, quality and affordable essential medicines and vaccines for all

3.9 By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination

3.a Strengthen the implementation of the World Health Organization Framework Convention on Tobacco Control in all countries, as appropriate

3.b Support the research and development of vaccines and medicines for the communicable and non-communicable diseases that primarily affect developing countries, provide access to affordable essential medicines and vaccines, in accordance with the Doha Declaration on the TRIPS Agreement and Public Health, which affirms the right of developing countries to use to the full the provisions in the Agreement on Trade-Related Aspects of Intellectual Property Rights regarding flexibilities to protect public health, and, in particular, provide access to medicines for all

3.c Substantially increase health financing and the recruitment, development, training and retention of the health workforce in developing countries, especially in least developed countries and small island developing States

3.d Strengthen the capacity of all countries, in particular developing countries, for early warning, risk reduction and management of national and global health risks

Data set used in the TOPSIS method

Countries	2010	2015	2019	2010	2015	2019	2010	2015	2019	2010	2015	2019
	3.1.1			3.2.1			3.2.1			3.2.2		
Albania	21	15	15	11.8	8.5	8.6	13.2	9.6	9.7	6.7	6	7.5
Bosnia-Herzegovina	11	10	10	6.3	5.4	5.1	7.2	6.3	5.9	5.1	4.6	4.2
Bulgaria	12	10	10	9.1	6.8	5.6	10.9	8.1	6.7	5.1	4	3.3
Croatia	9	8	8	4.7	4.2	4.1	5.5	4.9	4.8	3.6	3.1	2.9
Greece	3	3	3	3.4	3.9	3.3	3.9	4.4	3.8	2.1	2.7	2.3
Montenegro	7	6	6	5.8	3.1	2	6.6	3.6	2.3	4.3	2.1	1.3
North Macedonia	8	8	7	8.9	11.4	5.3	10.1	13	6.1	6.6	9.6	3.9
Romania	27	21	19	10.5	7.6	5.7	12.4	9.1	7	5.4	4.3	3.4
Serbia	12	13	12	6.6	5.5	4.6	7.6	6.3	5.3	4.8	4	3.2
Slovenia	8	7	7	2.6	2	1.7	3.2	2.5	2.1	1.8	1.4	1.2
Turkey	24	19	17	15.6	11.1	8.6	18.2	13	10	9.1	6.3	5.3
	3.3.2			3.4.1			3.4.2			3.5.2		
Albania	17	17	16	19.5	13.6	11.4	7.8	4.8	4.3	7.11	6.38	6.82
Bosnia-Herzegovina	45	40	27	20.1	19.2	18.7	10.5	10.7	10.9	7.36	7.16	7.81
Bulgaria	41	28	21	25.6	24.3	24.2	12.4	9.8	9.7	10.95	11.95	12.46
Croatia	18	13	8	18.8	17.6	16.1	18.3	17.6	16.4	9.96	8.81	8.73
Greece	4.7	4.7	4.3	13.4	13.1	12.5	3.5	5	5.1	9.86	10.78	10.5
Montenegro	20	15	15	23.6	22.8	22.3	20.3	20.7	21	15.21	11.07	12.24
North Macedonia	23	17	12	26.6	24.5	22.7	7.1	9.2	9.4	5.94	5.98	6.43
Romania	104	82	66	23.1	21.7	21	13.2	11.5	9.7	13.96	11.64	12.34
Serbia	30	21	14	24.6	22.2	22	17.2	16.4	11.4	11.94	8.8	8.85
Slovenia	9.5	7.2	5.4	13.5	12.8	11.4	20.7	21	19.8	11.54	12.74	12.11
Turkey	25	18	16	17.9	16.4	15.6	2.4	2.3	2.4	2.12	1.93	1.77
	3.6.1			3.7.2			3.8.1			3.9.3		
Albania	14.1	13.8	11.7	19.4	20.2	14.3	55	58	59	0.5	0.3	0.3
Bosnia-Herzegovina	16.9	15.8	13.5	13.5	10.5	9.9	56	60	61	0.4	0.4	0.4
Bulgaria	10.8	10.1	9.2	42	39.4	38.9	60	64	66	0.8	0.8	0.5
Croatia	10.5	9.3	7.9	12.4	9.6	8.6	71	60	71	0.5	0.4	0.4
Greece	13.1	9.3	8.3	10.8	8.4	8.6	70	74	75	0.2	0.1	0.2
Montenegro	15.7	8.5	7.6	16.8	11.2	10	65	67	68	0.6	0.6	0.6
North Macedonia	8.1	7.4	5.1	19	16.2	15.1	61	70	72	0.6	0.5	0.5
Romania	12	10	10.3	40	35.3	36.4	69	73	74	2.6	2	1.9
Serbia	9	6.7	7.5	19	16.4	14	55	65	65	0.6	0.4	0.3
Slovenia	7.2	6	5.1	4.9	4.5	3.8	77	79	79	0.5	0.4	0.2
Turkey	6.8	9.9	6.7	32	24.9	19.2	64	71	74	0.4	0.4	0.4
	3.b.1			3.b.1								
Albania	99	99	99	98	98	96						
Bosnia-Herzegovina	89	82	73	91	88	76						
Bulgaria	94	91	92	96	87	87						
Croatia	97	94	94	98	96	95						
Greece	99	99	99	77	83	83						
Montenegro	94	89	86	97	94	86						
North Macedonia	95	91	92	99	93	94						
Romania	94	89	88	93	80	76						
Serbia	91	95	97	91	86	91						
Slovenia	96	95	95	96	96	94						
Turkey	97	97	99	91	86	88						

REFERENCES

ANTCZAK, R.–ZAIDI, A. (2018): Well-being of older persons in Central and Eastern European countries *Research on Ageing and Social Policy* 6 (1): 26–52. https://doi.org/10.4471/rasp.2018.3109

APOSTU, S. A.–VASILE, V.–MARIN, E.–BUNDUCHI, E. (2022): Factors influencing physicians migration – A case study from Romania *Mathematics* 10 (3): 505. https://doi.org/10.3390/math10030505

ARAPOVIC, J.–SULAVER, Z.–RAJIC, B.–PILAV, A. (2019): The 2019 measles epidemic in Bosnia and Herzegovina: What is wrong with the mandatory vaccination program? *Bosnian Journal of Basic Medical Sciences* 19 (3): 210–212. http://dx.doi.org/10.17305/bjbms.2019.4266

COSTANTINI, A. S.–GALLO, F.–PEGA, F.–SARACCI, R.–VEERUS, P.–WEST, R. (2015): Population health and status of epidemiology in Western European, Balkan and Baltic countries *International Journal of Epidemiology* 44 (1): 300–323. https://doi.org/10.1093/ije/dyu256

DIMITROVA, M.–LAKIC, D.–PETROVA, G.–BEŠLIJA, S.–CULIG, J. (2020): Comparative analysis of the access to healthcare services and breast cancer therapy in 10 Eastern European countries *SAGE Open Medicine* 8: 1–10. https://doi.org/10.1177/2050312120922029

DOBOS, I.–MICHALKÓ, G.–SASVÁRI, P: (2021): The publication performance of Hungarian economics and management researchers: A comparison with the Visegrád 4 countries and Romania *Regional Statistics* 11 (2): 165–182. https://doi.org/10.15196/RS110207

EGRI, Z. (2017): Regional health inequalities in the European macroregion from the East Central European perspective *Regional Statistics* 7 (1): 197–224. https://doi.org/10.15196/RS0711

EIKEMO, T. A.–HUISMAN, M.–PERLMAN, F.–RINGDAL, K. (2009): Educational health inequalities in former Yugoslavia: evidence from the South-East European Social Survey Project *European Journal of Public Health* 20 (6): 640–646. https://doi.org/10.1093/eurpub/ckp200

GABRIEL, A. S.–MIHAELA, O. (2012): Health care performance and health financing systems in countries from Central and Eastern Europe *Transylvanian Review of Administrative Sciences* 8 (35): 22–32.

GHALEHTEIMOURI, K. J.–SHAMAEI, A.–CHE ROS, F. B. (2021): Effectiveness of spatial justice in sustainable development and classification of sustainability in Tehran province *Regional Statistics* 11 (2): 52–80. https://doi.org/10.15196/ RS110201

HUKIC, M.–RAVLIJA, J.–KARAKAS, S.–MULAOMEROVIC, M.–DEDEIC LJUBOVIC, A.–SALIMOVIĆ-BESIC, I.–SEREMET, M.–AHMETAGIC, S.–COMOR, A.–FERIC, E. (2015): An ongoing measles outbreak in the Federation of Bosnia and Herzegovina, 2014 to 2015 *Euro Surveillance* 20 (9): 21047. https://doi.org/10.2807/1560-7917.ES2015.20.9.21047

HWANG, C. L.–YOON, K. (1981): *Multiple Attribute Decision Making Methods and Applications* Springer-Verlag, New York.

ILI´C, M.–GRUJI`CI´C, M.–NOVAKOVI´C, B.–VRKATI´C, A.–LOZANOV-CRVENKOVI´C, Z. (2022): Cigarette smoking among medical students from the Western Balkan *International Journal of Environmental Research and Public Health* 19 (5): 3055. https://doi.org/10.3390/ijerph19053055

KRIPPENDORFF, K. (1986): *Information Theory: Structural Models for Qualitative Data, Quantitative Applications in the Social Sciences* Sage University, New York.

KUNITS, S. (2004): The making and breaking of Yugoslavia and its impact on health *American Journal of Public Health* 94 (11): 1894–1904. https://doi.org/10.2105/AJPH.94.11.1894

LAFORTUNE, G.–CORTÉS PUCH, M.–MOSNIER, A–FULLER, G.–DIAZ, M.–RICCABONI, A.– KLOKE-LESCH, A.–ZACHARIADIS, T.–CARLI, E.–OGER, A. (2021): *Europe Sustainable Development Report 2021: Transforming the European Union to achieve the Sustainable Development Goals* SDSN, SDSN Europe and IEEP, France: Paris.

LAZAR, D.–LITAN, C. M. (2022): Regional well-being in Romania: assessment after a decade of EU accession *International Journal of Social Economics* 49 (7): 1009–1028. https://doi.org/10.1108/IJSE-08-2021-0480

KULCSAR, L. J.–BROWN, D. L. (2017): Population ageing in Eastern Europe: Toward a coupled micro-macro framework *Regional Statistics* 7 (1): 115–134. https://doi.org/10.15196/RS07107

LEVY, D. T.–WIJNHOVEN, T. M. A.–LEVY, J.–YUAN, Z.–MAUER-STENDER, K. (2018): Potential health impact of strong tobacco control policies in 11 South Eastern WHO European Region countries *The European Journal of Public Health* 28 (4): 693–701. https://doi.org/10.1093/eurpub/cky028

LORCU, F.–BOLAT, B. A.–ATAKIŞI, A. (2012): Examining Turkey and member states of European Union in terms of health perspectives of Millennium Development Goals *Quality & Quantity* 46: 959–978. https://doi.org/10.1007/s11135-011-9648-1

MACKENBACH, J.–MCKEE, P. M. (2013): A comparative analysis of health policy performance in 43 European Countries *European Journal of Public Health* 23 (2): 195–344. https://doi.org/10.1093/eurpub/cks192

RADEVIĆ, S.–RADOVANOVIĆ, S.–DJONOVIĆ, N.–SIMIĆ VUKOMANOVIĆ, I.–MIHAILOVIĆ, N.– JANIĆIJEVIĆ, K.–KOCIĆ, S. (2018): Socioeconomic inequalities and non-communicable diseases in Serbia: National health survey *Vojnosanitetski Pregled* 75 (9): 926–934. https://doi.org/10.2298/VSP160329017R

RADU, M. C.–MANOLESCU, L. S.–CHIVU, R.–ZAHARIA, C.–BOERU, C.–POP-TUDOSE, M. E.– NECSULESCU, A.–OTELEA, M. (2022): Pregnancy in teenage Romanian mothers *Cureus* 14 (1): e21540. https://doi.org/10.7759/cureus.21540

RANCIC, N.–KOVACEVIC, A.–DRAGOJEVIC-SIMIC, V. (2015): Long-term health expenditure changes in selected Balkan countries *Frontiers in Public Health* 3:152. https://doi.org/10.3389/fpubh.2015.00152

SACHS, J.–SCHMIDT-TRAUB, G.–KROLL, C.–LAFORTUNE, G.–FULLER, G.–WOELM, F. (2021): *SUSTAINABLE DEVELOPMENT REPORT 2021 includes the SDG Index and Dashboards The Decade of Action for the Sustainable Development Goals* Cambridge University Press, Cambridge.

SDSN–IEEP, (2020): *The 2020 Europe Sustainable Development Report: Meeting the Sustainable Development Goals in the face of the COVID-19 pandemic* Sustainable Development Solutions Network and Institute for European Environmental Policy, Paris and Brussels.

STEPOVIC, M.–RANCIC, N.–VEKIC, B.–DRAGOJEVIC-SIMIC, V.–VEKIC, S.–RATKOVIC, N.–JAKOVLJEVIC, M. (2020): Gross domestic product and health expenditure growth in Balkan and East European Countries – Three-decade horizon *Frontiers in Public Health* 8: 492. https://doi.org/10.3389/fpubh.2020.00492

TEZCAN, N. (2020): Sürdürülebilir Kalkinma Amaçlari Kapsaminda Türkiye'de Sağlik Göstergelerinin Analizi *İstanbul Ticaret Üniversitesi Sosyal Bilimler Dergisi* Prof. Dr. Sabri ORMAN Özel Sayısı: 202–217.

TRESA, E.–BENMARHNIA, T.–CLEMENS, T.–BURAZERI, G.–CZABANOWSKA, K. (2017): Europeanization process impacts the patterns of alcohol consumption in the Western Balkans *The European Journal of Public Health* 28 (3): 516–521. https://doi.org/10.1093/eurpub/ckx175

UVALIC, M.–CVIJANOVIC, V. (2018): *Towards A Sustainable Economic Growth and Development in the Western Balkans* Friedrich-Ebert-Stiftung, Regional Office for Croatia and Slovenia, Zagreb, Croatia.

VEKIC, B.–DRAGOJEVIC-SIMIC, V.–JAKOVLJEVIC, M.–KALEZIC, M.–ZAGORAC, Z.–DRAGOVIC, S.–ZIVIC, R.–PILIPOVIC, F.–SIMIC, R.–JOVANOVIC, D.–MILOVANOVIC, J.–RANCIC, N. (2020): A Correlation Study of the Colorectal Cancer Statistics and Economic Indicators in Selected Balkan Countries *Frontiers in Public Health* 8: 29. https://doi.org/10.3389/fpubh.2020.00029

ZELENY, M. (1974*): Linear Multiobjective Programming. (Lecture Notes in Economics and Mathematical Systems)* Springer-Verlag, Heidelberg. https://doi.org/10.1007/978-3-642-80808-1

INTERNET SOURCES

MATKOVIC, G. (2017): *The Welfare State in Western Balkan countries – Challenges and Options* Center for Social Policy, Belgrade. http://futureofthewelfarestate.org/wp-content/uploads/2018/04/The_Welfare_State_in_Western_Balkan_Countries_Position_Paper.pdf (downloaded: February 2022)

SANFEY, P.–MILATOVIC, J.–KRESIC, A. (2016): *How the Western Balkans Can Catch up?* Working Paper, No.185, European Bank for Reconstruction and Development. https://www.ebrd.com/news/2016/how-the-western-balkans-can-catch-up.html (downloaded: February 2022)

UN (2020): *The Sustainable Development Goals Report 2020.* https://unstats.un.org/sdgs/report/2020/ (downloaded: February 2022)

XU, K.–SAKSENA, P.–HOLLY, A. (2011): *The Determinants of Health Expenditure: A Country-Level Panel Data Analysis* Working Paper of the Results for Development Institute (R4D) https://r4d.org/wp-content/uploads/TransisitionsInHealthFinancing_DeterminantsofExpenditures.pdf (downloaded: February 2022)

DATABASES/WEBSITES

[1] https://www.britannica.com/place/Balkans

[2] EUROPEAN COMMISSION (EC) (2022): *Countries and regions – Western Balkans.*
https://ec.europa.eu/trade/policy/countries-and-regions/regions/western-balkans/#:~:text=Albania%2C%20Bosnia%20and%20Herzegovina%2C%20North,Montenegro%2C%20Serbia%2C%20Kosovo* (downloaded: April 2022)

[3] EUROPEAN UNION (EU) (2022): *Joining the EU.*
https://european-union.europa.eu/principles-countries-history/joining-eu_en
(downloaded: April 2022)

[4] UN (2021a): *Global Indicator Framework for the Sustainable Development Goals and Targets of the 2030 Agenda for Sustainable Development.*
https://unstats.un.org/sdgs/indicators/indicators-list
(downloaded: December 2021)

[5] UN (2021b): *Global SDG Database.*
https://unstats.un.org/sdgs/indicators/database/
(downloaded: November 2021)

[6] WORLD BANK (WB) (2022): *World Development Indicators.*
https://databank.worldbank.org/source/world-development-indicators
(downloaded: April 2022)

[7] WORLD BANK COUNTRY AND LENDING GROUP.
https://datahelpdesk.worldbank.org/knowledgebase/articles/906519
(downloaded: April 2022)