

PROMOTING AND PROTECTING HEALTH AS A PRIORITY ON THE ROAD TO SUSTAINABLE DEVELOPMENT

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Purpose: The article aims to assess the situation of the European Union countries regarding health promotion and protection. The study has adopted indicators related to Sustainable Development Goal 3 (SDG3) in 27 EU countries in two research periods (2014 and 2020) so that it will be possible to assess the situation of the studied countries and indicate which countries have improved or not their situation related to the studied phenomenon.

Design/methodology/approach: A taxonomic measure of development based on Weber's median vector was used to assess the implementation of SDG3 in EU countries. Upon its basis, rankings of EU countries were constructed, and typological groups of similar levels were determined due to the studied phenomenon.

Findings: The study results showed that the older EU member states are characterised by a better situation in health protection and promotion compared to the newer, mostly post-communist countries. The best-rated countries in the first research period were Sweden, the Netherlands and Denmark, while in the second one, it was again Sweden, the Netherlands and Ireland.

Social implications: The results of the studies presented in this paper can be useful for the diagnosis of the results achieved so far and for the revision of the health policy of the whole European Union as well as of the individual countries in the future.

Originality/value: This article is part of the debate on combining health promotion and protection, emphasising a balanced diet and physical activity, and sustainable development. Health promotion, a process that enables people to increase control and improve their health, is expected to play an important (and transformative) role in achieving the sustainable development of Goal 3 (ensuring health for all and at all ages).

Keywords: sustainable development; health promotion and protection; Weber's median.

Category of the paper: Research paper.

1. Introduction

Public health is one of the key challenges of sustainable development. According to the World Health Organization (WHO), health is a state of complete physical, mental and social well-being, not just a lack of disease or infirmity (Sartorius, 2006). Two concepts are closely related to health: its protection and promotion. Health care is an activity aimed at preventing and treating diseases, maintaining mental, physical and social development of a person, extending life, and ensuring healthy development for the next generations. On the other hand, health promotion means creating conditions that facilitate and encourage a healthy lifestyle. Apart from prophylaxis and health education, it is one of the basic elements of public health.

Health protection and promotion are designed to improve the health of the population by preventing disease, controlling risks, improving fitness and well-being and increasing the ability of workers to work and function in society. Health promotion activities take different forms but generally focus on exercise and activity, diet, cancer prevention, smoking cessation and treating chronic diseases through wellness programs (Mendes, Dias, 2011).

There is a close relationship between health and other elements of sustainable development (Adshead, Thorpe, Ruter, 2006; Acharya, Lin, Dhingra, 2018). Indeed, health depends on environmental (e.g., climate change and energy, sustainable transportation, sustainable production and consumption, natural resource management), economic (e.g., population wealth, unemployment) and social (e.g., demographic factors, social exclusion) issues. Therefore, public health is not only a significant outcome but also a prerequisite for sustainable development. A similar view is taken by Fortune et al. (2018), who emphasise the direct or indirect links between health and all the Sustainable Development Goals. They also highlight the importance of health promotion in achieving equality, strengthening communities and protecting human rights. Ayres and Agius (2004) also wrote on health protection in the light of sustainable development, pointing to the need for an interdisciplinary approach to develop an integrated and comprehensive strategy. According to Porritt (2005), sustainable development concerns improving the physical, social and personal quality of life of individuals in a way that does not hinder future generations.

In May 2018, World Health Organization (WHO) member states approved a new WHO General Program of Work for 2019-2023. It is based on sustainable development objectives and is intended to help countries stay on track to meet SDG3 and other health-related goals. Its three strategic priorities are universal health coverage, health security, and improving health and well-being (WHO, 2018). According to Mohammed and Ghebreyesus (2018), universal health insurance can help reduce poverty (Goal 1) by protecting the population from financial hardship, and good health can drive employment and economic growth (Goal 8). Well-organised health systems can also provide support against the social and economic consequences of epidemics and other health emergencies.

In recent decades, significant progress has been made in extending overall and healthy life expectancy, reducing maternal and child mortality, managing national and global health risks and reducing the burden of communicable and non-communicable diseases (Menne et al., 2020). The implementation of the 2030 Agenda is progressing in all European WHO member states, but current projections indicate that no country is fully on track to achieve the health-related goals and that there is room for further strengthening and accelerating implementation at a faster pace. Some health goals in SDG3 and other health objectives will only be achieved if actions are accelerated across society. It includes halving the number of deaths and injuries worldwide from traffic accidents, reducing tuberculosis and new HIV infections, increasing vaccination rates, tackling risk factors such as obesity, alcohol, smoking and air pollution, combating mental health disorders and reducing interpersonal violence (WHO, 2019). A healthy lifestyle is an important condition for sustainable development (Bozkurt, Ergen, 2015; Farhud, 2017). Therefore, studying society for its health habits and promoting a healthy lifestyle that supports sustainable development is necessary.

The article aims to assess the situation of the European Union countries regarding health promotion and protection. The study has adopted indicators related to Sustainable Development Goal 3 (SDG3) in 27 EU countries in two research periods (2014 and 2020) so that it will be possible to assess the situation of the studied countries and indicate which countries have improved or not their situation related to the studied phenomenon. This article is part of the debate on combining health promotion and protection, emphasising a balanced diet and physical activity, and sustainable development. Health promotion, a process that enables people to increase control and improve their health, is expected to play an important (and transformative) role in achieving the sustainable development of Goal 3 (ensuring health for all and at all ages).

The layout of this article includes an introduction that outlines the paper's main purpose and explains the authors' key motivations for conducting research on health promotion and protection in EU countries. In addition, a review of the literature concerning the phenomenon under study is included. The following section discusses the statistical data used in the article and describes the research procedure. Finally, the results of the study, discussion, and conclusions of the study are presented.

2. Literature review

The growing challenges in promoting public health include, on the one hand, workplace activities, local, national and international health programs, and the possibility of opening up pathways for non-medical professionals. These challenges are related to, among other things: the limited number of centres offering health promotion and infection control education, the focus on hospitals and clinics, the emergence of resurgent as well as new infections,

globalisation and the movement of people, bacterial resistance, and vaccination coverage (Ansari, Privett, 2005). Developing a unified program in this area is a current challenge in the modern world.

Swerissen and Crisp (2004) stress that interventions applied at the wrong social system level are unlikely to be effective, not to mention sustainable development. Interventions that isolate individual action from the social context are unlikely to yield a sustainable health benefit without changes in the organisational, social and institutional conditions that make up the social context. Health promotion programs are more likely to produce lasting effects if they are adapted to the appropriate levels of social organisation in order to achieve better health outcomes.

Enterprises are an excellent place to promote health and make changes in this area at the organisational level for the benefit of society as a whole. Finding ways to promote the health and well-being of employees, who often spend more than half of their lives in the workplace, should become one of the priorities for enterprise managers. According to Chen et al. (2015), well-functioning health programs will improve individual and collective labour productivity and increase the efficiency of the entire organisation.

Occupational health is most often associated with protecting workers from occupational injuries and diseases, and measures taken by workplaces include health and safety training, guaranteeing protective clothing and organising work in such a way as to guarantee workers' safety as much as possible. How to protect workers from all kinds of hazards encountered in the workplace was presented by Liu (2020), comparing five legal systems (European Union, Netherlands, United Kingdom, Sweden and China) on occupational health and safety. On the other hand, the study of Jonathan and Mbogo (2016) on the operation of health and safety systems in secondary schools showed that most teaching staff were not involved in training programs that would equip them with safety skills in the workplace. It significantly affected their preparation in matters of health risks and thus their overall performance. Similar conclusions were reached by Allender, Colquhoun and Kelley (2011), who attempted to evaluate the effectiveness of workplace health programs at a multinational IT company.

Health promotion usually includes activities that maintain or improve employees' health, ranging from health risk assessments to health initiatives and immunisations (Hymel et al., 2011). An increasing number of companies are undertaking "new" protection and health promotion in the workplace, improving workers' overall well-being. Dugdill (2000) considers that health promotion strategies should address both psychosocial issues and create bridges between the home and work environments if the health of the working population is to improve. Indeed, there are very few comprehensive workplace health programs, and it would be good for programs to be designed by a health "expert" rather than developed by the workforce. Behavioural changes that improve health have been described by Sorensen et al. (1998), among others. They have attempted to assess the impact of two-year integrated interventions on workplace health and promoting changes in eating habits and quitting smoking. The study was

conducted at 24 manufacturing plants in Massachusetts, with between 250 and 2,500 employees at each plant. The results of the introduced intervention resulted in changes in nutrition (a reduction in caloric intake), but no significant changes in quitting cigarette smoking were noted. The authors emphasise that even small-scale interventions can raise awareness and have an impact on reducing coronary heart disease. The impact of improving the quality of food in employee cafeterias as a factor in increasing awareness of healthy meal choices outside of work as well, contributing to a reduction in overweight and obesity was written about by Lassen et al. (2014). Studies conducted in workplaces show that blue-collar workers are less likely to participate in health promotion programs (Sorensen et al., 1996). The implication is that top-down management-imposed changes in nutrition and smoking reduction have more supporters among white-collar workers.

Reflection on the broad application of corporate strategies to promote physical activity among employees and their families through employer-sponsored initiatives was described by Pronk and Kottke (2009). They believe that the benefits of physical activity are manifold, including primarily improved health and well-being and increased productivity. According to them, the promotion of physical activity in the workplace should be an integrated initiative that measurably improves employee health and, consequently, the company's financial performance.

The improvement of physical activity using workplace pedometers was evaluated by Chan, Ryan and Tudor-Locke (2004) and Backholer, Freak-Poli and Peeters (2012). They assessed the effect of controlling the number of steps on changes in body mass index (BMI), waist circumference, resting heart rate and blood pressure. They found that sedentary workers obtained health benefits, and pedometers' use contributed to increased physical activity.

The way to create a sustainable health culture at work is to strategically and systematically integrate various environmental, health and safety policies and programs that improve workers' overall health and well-being and prevent work-related injuries and illnesses. As a result, employees believe that the organisation cares about them and can transfer good practices to their personal lives. It will, to a large extent, contribute to strengthening the overall national health system and overall better health outcomes for the entire population.

While much attention has been paid to protecting and promoting health among workers, it should be noted that the workplace environment can be used successfully to promote healthy lifestyles. It is a perfect place to introduce activities that, on the one hand, teach and, on the other, perpetuate the application of health-promoting principles by employees and, indirectly, by their families. In addition, employers represent a powerful stakeholder group that should influence health policy initiatives aimed at creating supportive environments in the workplace, as well as in the broader community.

3. Research methodology

3.1. Stages of the applied research procedure

In this study, a 3-stage research procedure was used to assess the situation of the European Union countries relating to SDG3 implementation, the successive stages of which are shown in Figure 1. The first stage included the collection of statistical data on SDG3 implementation indicators in 27 EU countries in two years: 2014 and 2020. After a detailed description of the indicators adopted for the study with the use of the selected measures of descriptive statistics, the distributions of the indicators adopted for the study were analysed.

The second step included the selection and design of the synthetic measure. Given the high variation and asymmetry of most indicators, it was decided to use a positional taxonomic measure based on Weber's median. Based on this measurement, the three medians method was used to determine typological groups with similar levels of the phenomenon under study.

The final step is to analyse and interpret the results obtained. On the basis of the created rankings and designated typological groups, the situation of the studied countries was evaluated in terms of the implementation of SDG3. In addition, using Kendall's tau measure, it was examined whether there was a relationship between the obtained rankings of countries in the years under consideration.

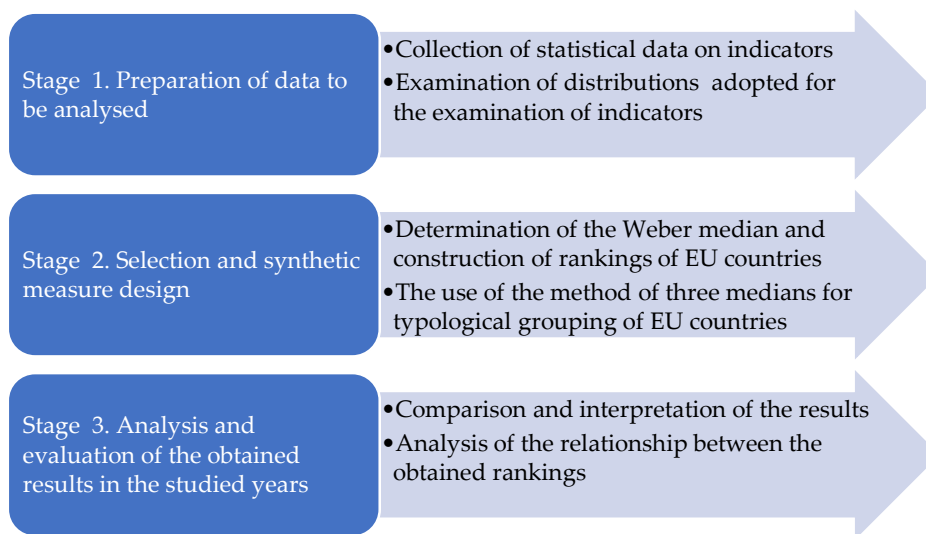


Figure 1. Research procedure chart.

Source: own elaboration.

3.2. Statistical materials

The indicators proposed by Eurostat help in measuring the level of goals' achievement. According to Eurostat, the indicators prepared by them were organized in accordance with the goals of sustainable development and have universal in nature, i.e. they can be used to monitor more than one goal of sustainable development. All indicators are grouped into sub-topics to emphasize the interrelationship and highlight different aspects of each SDG.

The baseline data for this study's attempt to compare European Union countries in terms of health protection and promotion came from the Eurostat (2022) database and was for the years 2014 and 2020 (in a few cases, due to lack of data, the previous year was chosen). A great difficulty in carrying out this type of analysis is the collection of reliable and comparable statistical data. It turns out that the databases of the statistical offices of the EU countries do not always provide complete and up-to-date information. In this study, due to the availability of data, it was decided to compare the years 2014 and 2020, due to the fact that these two periods were characterized by complete data for all indicators and EU countries. For example, the smoking prevalence indicator included in the Eurostat database was fully available for the years 2014, 2017 and 2020. The remaining indicators were available for a greater number of years, but due to the desire to use as many indicators as possible, and in order to fully compare the EU countries, the above periods were taken to comparison.

This study uses the available indicators that have been assigned by Eurostat to SDG 3 group of sustainable development indicators. Moreover, two indicators were added which, in the Authors' opinion, are in line with the implementation of the tasks related to SDG3. The first of these indicators (Y_{12D} - Frequency of alcohol consumption every day) relates to the achievement of the target 3.5: Prevent and treat substance abuse. The second (Y_{13D} - Time (zero minutes) spent on health-enhancing (non-work-related) aerobic physical activity by sex and educational attainment level) was linked to goal 3.4: Reduce mortality from non-communicable diseases and promote mental health, taking into account the recommendations of specialists in the field of medicine that physical effort and exercise are an excellent prevention of many civilization diseases. Regular physical activity, are health-enhancing behaviours that contribute to health improvement and social development (Macassa, 2022).

Table 1 presents a list of diagnostic features used in the study. These relate to indicators describing the implementation of SDG3. The availability of data determined the choice of features. The influence of each characteristic on the analysed phenomenon was also shown by classifying it into a set of characteristics stimulating development in the area (symbol S) or destimulating this development (symbol D). It is worth noting that the destimulants are strongly predominant; only two indicators (Y_{1S} and Y_{2S}) are classified in the set of stimulants.

Table 1.
Base of indicators

Symbol	Indicator	Name of the indicator	Indicator description
Y_{1S}	SDG_03_10	Healthy life years at birth	The indicator of healthy life years measures the number of remaining years that a person of specific age is expected to live without any severe or moderate health problems.
Y_{2S}	SDG_03_20	Share of people with good or very good perceived health	The indicator is a subjective measure on how people judge their health in general on a scale from "very good" to "very bad". It is expressed as the share of the population aged 16 or over perceiving itself to be in "good" or "very good" health.
Y_{3D}	SDG_03_30	Smoking prevalence (every day)	The indicator measures the share of the population aged 15 years and over who report that they currently smoke boxed cigarettes, cigars, cigarillos or a pipe.
Y_{4D}	SDG_03_40	Standardised death rate due to tuberculosis, HIV and hepatitis by type of disease	The rate is calculated by dividing the number of people dying due to selected communicable diseases by the total population.
Y_{5D}	SDG_03_42	Standardised preventable and treatable mortality	Preventable mortality refers to mortality that can mainly be avoided through effective public health and primary prevention interventions (i.e. before the onset of diseases/injuries, to reduce incidence).
Y_{6D}	SDG_03_60	Self-reported unmet need for medical examination and care	The indicator measures the share of the population aged 16 and over reporting unmet needs for medical care due to one of the following reasons: 'Financial reasons', 'Waiting list' and 'Too far to travel' (all three categories are cumulated).
Y_{7D}	SDG_02_10	Obesity rate by body mass index (BMI)	The indicator measures the share of obese people based on their body mass index (BMI). BMI is defined as the weight in kilos divided by the square of the height in meters. People aged 18 years or over are considered obese with a BMI equal or greater than 30. Other categories are: underweight (BMI less than 18.5), normal weight (BMI between 18.5 and less than 25), and pre-obese (BMI between 25 and less than 30). The category overweight (BMI equal or greater than 25) combines the two categories pre-obese and obese.
Y_{8D}	SDG_08_60	Fatal accidents at work per 100 000 workers	The indicator measures the number of fatal accidents that occur during the course of work and lead to the death of the victim within one year of the accident. The incidence rate refers to the number of fatal accidents per 100 000 persons in employment.
Y_{9D}	SDG_11_20	Population living in households considering that they suffer from noise, by poverty status	The indicator measures the proportion of the population who declare that they are affected either by noise from neighbours or from the street.
Y_{10D}	SDG_11_40	Road traffic deaths, by type of roads	The indicator measures the number of fatalities caused by road accidents, including drivers and passengers of motorised vehicles and pedal cycles as well as pedestrians. The average population of the reference year (calculated as the arithmetic mean of the population on 1st January of two consecutive years) is used as denominator (per 100 000 persons).

Cont. table 1.

Y_{11D}	SDG_11_50	Years of life lost due to PM2.5 exposure	The indicator measures the years of life lost (YLL) due to exposure to particulate matter (PM2.5). PM2.5 are particulates whose diameter is less than 2.5 micrometres and which can be carried deep into the lungs where they can cause inflammation and exacerbate the condition of people suffering heart and lung diseases. YLL is defined as the years of potential life lost as a result of premature death. It is an estimate of the average number of years that a person would have lived if they had not died prematurely.
Y_{12D}	Goal 3.5.	Frequency of alcohol consumption every day	This indicator measures the share of people in the population who consume alcohol daily. According to the WHO, alcohol abuse is one of the most important factors affecting the health of people around the world.
Y_{13D}	Goal 3.4.	Time (zero minutes) spent on health-enhancing (non-work-related) aerobic physical activity by sex and educational attainment level	Physical activity should be done every day to reduce the risk of disease, according to World Health Organization recommendations. Nutritional errors and the lack of exercise are the most common cause-and-effect relationships of overweight and obesity.

Source: own elaboration.

In the next step, the indicators adopted for the study were characterised by determining their selected descriptive characteristics (Table 2). The preliminary analysis of the diagnostic characteristics shows that there are large disparities between countries due to the indicators studied. The coefficients of variation in 2020 ranged from 7.19% (Y_{1S} – healthy life years at birth) to 117.65% (Y_{6D} – the self-reported unmet need for medical examination and care), with variation exceeding 30% for most features. The diversity of indicators in 2014 looks similar. The consequence of the high dispersion of features is also their high asymmetry. It should be noted that right-sided asymmetry dominates, indicating the predominance of EU countries with index values below the average value, which is positive for features that are destimulants. It is evident in the case of the indicator with the highest level of variation (Y_{6D}), which is also characterised by a very high measure of asymmetry. In 2014, the average value of this indicator was 3.9%, and for only eight countries, it was above the average, with Latvia having the highest value (12.5%). Among the countries where the index was below 0.5%, there were only: Austria (0.1%) and Slovenia (0.2%). In 2020, the average value of this indicator for the EU-27 decreased to 2.3%, with the highest value for Estonia (13.0%), and the lowest (below 0.5%), countries such as: Malta (0%), Luxembourg (0.1%), Germany (0.1%), Austria (0.1%), Netherlands (0.2%), Spain (0.4%), Cyprus (0.4%).

Noteworthy is the Y_{2S} (the share of people with good or very good perceived health) indicator, which is characterised by strong left-sided asymmetry, which means that in most EU countries, the population aged 16 or older rated their health above the EU average, which in 2014 was 66.16% and 68.1% in 2020. The lowest rating of this indicator was given by the residents of Lithuania (44.3% in 2020 compared to 45% in 2014), and the highest by the residents of Ireland (83.7% in 2020 compared to 82.7% in 2014).

Table 2.

Selected descriptive characteristics of the indicators adopted for the study in the years 2014 and 2020

Symbol	2014			2020		
	\bar{x}	Vs (%)	As	\bar{x}	Vs (%)	As
Y_{1S}	61.63	7.75	0.69	62.38	7.19	0.21
Y_{2S}	66.16	15.34	-0.71	68.12	13.55	-0.87
Y_{3D}	25.96	21.57	-0.22	24.59	30.87	0.03
Y_{4D}	3.24	82.82	1.47	2.20	103.15	2.19
Y_{5D}	307.07	39.81	0.90	280.09	39.97	0.85
Y_{6D}	3.93	90.63	1.17	2.31	117.65	2.50
Y_{7D}	52.95	7.36	-0.28	55.25	8.84	-0.06
Y_{8D}	2.47	50.96	0.78	1.97	43.59	0.10
Y_{9D}	16.79	31.01	0.84	16.04	35.10	0.69
Y_{10D}	5.83	36.31	0.40	4.54	34.34	0.63
Y_{11D}	904.78	44.37	0.99	749.33	44.63	0.67
Y_{12D}	7.53	69.21	1.19	6.78	65.73	0.97
Y_{13D}	48.93	35.43	0.10	49.66	35.17	-0.06

Source: own elaboration.

3.3. Method

In the article, a taxonomic measure of development based on Weber's (Weber, 1971) median vector was used to assess the implementation of SDG3 in EU countries. This method is used to linearly order multivariate objects due to the development of a distinguished phenomenon. Weber's median allows the construction of a synthetic measure, which considers not only the high resistance to outlier observations, but also the relationships between the studied characteristics. There are many examples in the literature of the application of this method (Pulido, Sanchez-Soriano, 2009; Bąk, 2014; Młodak, 2014; Pechersky, 2015; Adam, Kroupa, 2017). The indisputable advantage of this method is its resistance to outliers, which in the case of very mixed results of European Union countries in the analysed areas, is an essential factor influencing its choice in the presented study. The Weber median was calculated in *R program: l1median* of package: *pcaPP*. The determination of the taxonomic meter proceeds in the following stages (Cheba, Bąk, 2020):

1. Normalization of the diagnostic features.

The positional option of the linear object assignment takes a different normalization formula, in comparison with the classical approach, based on a quotient of the feature value deviation from the proper coordinate of the Weber median and a weighed absolute median deviation, using the Weber median (Młodak, 2014):

$$z_{ij} = \frac{x_{ij} - \theta_{0j}}{1.4826 \cdot \text{mãd}(X_j)}, \quad (1)$$

where: $\theta_0 = (\theta_{01}, \theta_{02}, \dots, \theta_{0m})$ is the Weber median, $\text{mãd}(X_j)$ is the absolute median deviation, in which the distance from the features to the Weber vector is measured, i.e.: $\text{mãd}(X_j) = \text{med}_{i=1,2,\dots,n} |x_{ij} - \theta_{0j}|$ ($j = 1, 2, \dots, m$).

2. Calculation of taxonomic measure of development.

The synthetic measure μ_i is calculated on the basis of maximum values of normalized features, similarly to the Hellwig (1968) method:

$$\phi_j = \max_{i=1,2,\dots,n} z_{ij}, \quad (2)$$

according to the following formula:

$$\mu_i = 1 - \frac{d_i}{d_-}, \quad (3)$$

where: $d_- = \text{med}(\mathbf{d}) + 2,5\text{mad}(\mathbf{d})$ where $\mathbf{d}=(d_1, d_2, \dots, d_n)$ is a distance vector calculated using the formula: $d_i = \text{med}_{j=1,2,\dots,m} |z_{ij} - \phi_j|$ $i = 1, 2, \dots, n$, ϕ_j – the i -th coordinate of the development pattern vector, which is constituted of the maximum values of the normalized features.

3. The division of objects (countries) into four typological groups.

For this purpose, the three-median method was used, which consists in determining the median coordinates of the vector $\mu = (\mu_1, \mu_2, \dots, \mu_n)$, which is marked with a symbol $\text{med}(\mu)$. The calculated median divides the collection of objects into two groups. The first group includes objects for which the values of the measure are not greater than the median, and the second group includes objects with values exceeding the median level. Subsequently, in the separated groups, the medians are determined again, which divide the first and second groups into two further subgroups. It can be written as follows: $\text{med}_k(\mu) = \text{med}_{i:\Gamma_i \in \Omega_k}(\mu_i)$, where $k = 1, 2$.

This way, four groups of objects with the following values of the development measure are obtained:

I group: $\mu_i > \text{med}_1(\mu)$,

II group: $\text{med}(\mu) < \mu_i \leq \text{med}_1(\mu)$,

III group: $\text{med}_2(\mu) < \mu_i \leq \text{med}(\mu)$,

IV group: $\mu_i \leq \text{med}_2(\mu)$.

In the next step, based on the results obtained between the positions held by countries in each ranking in 2014 and 2020, the correlation coefficient τ Kendall was calculated according to the formula (Sanderson, Soboroff, 2007):

$$\tau = \frac{P-Q}{\sqrt{(P+Q+T) \cdot (P+Q+U)}}, \quad (4)$$

where:

P – the number of correctly-ordered pairs,

Q – the number of incorrectly ordered pairs,

T – the number of ties in 1st ranking,

U – the number of ties in 2nd ranking.

Kendall's τ measure is used when there are rankings from different sources (in different years) and for several facilities, and it is important to assess the consistency of these rankings. This coefficient takes values from the range of $\langle -1, 1 \rangle$; it indicates not only the strength but

also the direction of dependence. It is an excellent tool for describing the similarity of the ordering of a data set (Okazaki, Yutaka, Mitsuru, 2004; Lapata, 2006).

4. Results of the research

Table 3 shows the results of the rankings and typological groups of EU countries obtained using the taxonomic measure of development calculated for the implementation of SDG3 in 2014 and 2020. The positions of individual countries in the obtained rankings tended to vary, except for six countries whose positions did not change in the years under study. Sweden invariably remained the leader, and the positions of the countries occupying the last positions in the table, i.e. Latvia (27th position) and Romania (26th position), did not change. The following also remained in the same places: Germany (6th position), Belgium (8th position) and France (15th position).

Eight countries moved no further than one place, and two countries (Austria and Portugal) moved two places. The implementation of SDG3 in 2020, compared to 2014, worsened in 10 countries – Croatia (down from 17th to 24th place) and Slovakia (down from 12th to 18th place) were the most affected. Eleven member countries showed improvement, with the highest noted in Italy (from 18th to 12th position), Greece (from 21st to 16th position) and Cyprus (from 9th to 5th position).

Since the positions of individual EU countries in the years of the study are not the same (in some cases, the changes in the ranking are significant), Kendall's tau coefficient was determined in order to assess the consistency of the ordering of the studied objects. Its high value (0.778) confirms the consistency of the linear ordering of countries, despite differences in the positions of some objects.

The observation of typological groups in the analysed years shows that the changes in the membership of countries in individual groups concerned 12 countries, six of which advanced by one group higher, and the remaining six also decreased by one group.

Table 3.

Ranking and typological groups of EU countries due to SDG3 implementation in 2014 and 2020

Country	2014			2020		
	μ_i	rank	group	μ_i	rank	group
Belgium	0.637	8	II	0.678	8	II
Bulgaria	0.181	23	IV	0.340	22	IV
Czechia	0.382	19	III	0.401	20	III
Denmark	0.728	3	I	0.685	7	II
Germany	0.676	6	I	0.707	6	I
Estonia	0.356	20	III	0.348	21	IV
Ireland	0.693	5	I	0.801	2	I

Cont. table 3.

Greece	0.347	21	IV	0.481	16	III
Spain	0.539	14	III	0.560	13	II
France	0.531	15	III	0.519	15	III
Croatia	0.403	17	III	0.196	24	IV
Italy	0.393	18	III	0.581	12	II
Cyprus	0.607	9	II	0.726	5	I
Latvia	-0.379	27	IV	0.019	27	IV
Lithuania	0.122	24	IV	0.144	25	IV
Luxembourg	0.567	11	II	0.608	10	II
Hungary	0.435	16	III	0.455	17	III
Malta	0.660	7	II	0.763	4	I
Netherlands	0.888	2	I	0.779	3	I
Austria	0.540	13	II	0.581	11	II
Poland	0.332	22	IV	0.413	19	III
Portugal	0.122	25	IV	0.285	23	IV
Romania	0.018	26	IV	0.130	26	IV
Slovenia	0.587	10	II	0.533	14	III
Slovakia	0.566	12	II	0.447	18	III
Finland	0.714	4	I	0.649	9	II
Sweden	0.912	1	I	0.919	1	I

Source: own elaboration.

Based on a detailed analysis of the values of indicators in the years under study, it is possible to identify those that contribute to the formation of the value of the synthetic measure and thus rank the countries according to the level of the phenomenon under study i.e. the realisation of SDG3.

The best situation due to the implementation of SDG3 occurs in northern and western Europe countries. Sweden and Ireland, which are at the top of the ranking, are characterised by high indicators for Healthy life years at birth (Y_{1S}) and the Share of people with good or very good perceived health (Y_{2S}). The first of these indicators is the highest for Sweden, while the second reaches the maximum value in the case of Ireland. In addition, these countries have low rates related to, for example, the Standardised death rate due to tuberculosis, HIV and hepatitis by type of disease (Y_{4D}), Road traffic deaths by type of roads (Y_{10D}). The high position of the Netherlands in the analysed years is a consequence of low values of destimulant indicators, such as the Standardised death rate due to tuberculosis, HIV and hepatitis by type of disease (Y_{4D}), Self-reported unmet need for medical examination and care (Y_{6D}), Obesity rate by body mass index (BMI) (Y_{7D}), Fatal accidents at work per 100 000 workers (Y_{8D} – the lowest value among EU countries).

Latvia, at the bottom of the ranking in both years under review, has the lowest Healthy life years at birth (Y_{1S}) index and the highest level of the Standardised death rate due to tuberculosis, HIV and hepatitis by type of disease (Y_{4D}) among EU countries. The penultimate in the ranking of Romania has the highest level of destimulant indicators in the member countries, such as Standardised preventable and treatable mortality (Y_{5D}), Road traffic deaths, by type of roads (Y_{10D}), and Time (zero minutes) spent on health-enhancing (non-work-related) aerobic physical activity by sex and educational attainment level (Y_{13D}).

5. Discussion

In this article, based on the 13 indicators related to the implementation of SDG3 adopted for the study, a ranking of EU countries and typological groups with similar levels was constructed in terms of the phenomenon studied. The older EU Member States were better assessed in terms of the indicators adopted for the study than the newer, mostly post-communist countries. The top-ranked countries in the first study period (2014) were Sweden, the Netherlands and Denmark, while in the second one (2020), they were again Sweden, the Netherlands and Ireland, which in 2020 advanced to the second position compared to the fifth in 2014. However, Latvia and Romania were at the end of the ranking in both surveyed years. It is significant that the fourth worst typological group in 2020 included countries (except Portugal) that joined the EU in 2004 or later. They stand out negatively in terms of the high mortality rates due to diseases (Y_{4D} – Standardised death rate due to tuberculosis, HIV and hepatitis by type of disease, Y_{5D} – Standardised preventable and treatable mortality) and higher mortality rates at work (Y_{8D}) and due to road accidents (Y_{10D}). In order to improve the above indicators, these countries should improve their health care systems so that they can detect and treat diseases more effectively, especially preventable ones. That may affect the increase in the Y_{1S} (Healthy life years at birth) index, which assumed the lowest value for Latvia and was the most positive for Sweden. On the other hand, higher rates of road fatalities in less developed EU countries may be associated with lower road quality, lower quality of used vehicles and the lack of motorway networks. Hence, investment in road infrastructure is needed in these Member States.

In former post-communist countries, the exposure to particulate air pollution (Y_{11D}) was also higher. The highest value of the indicator concerned Bulgaria (1,606), followed by Romania (1,261), which joined the community in 2007. For Sweden, ranked first, the indicator was several times lower in 2020 and reached the level 258. The implication is that countries classified in group IV need to focus more on improving air quality and the environment, which will reduce exposure to particulate air pollution and could lead to a reduction in pollution-related mortality. Countries that have been in the EU since 2004 have lower levels of Y_{9D} (Population living in households considering that they suffer from noise, by poverty status) compared to other countries. In this case, southern European countries are leading the way: Malta (30.8%) and Portugal (25.1%) and northern (the Netherlands – 25.5%). High noise and air pollution with dust significantly impact public health, especially on the appearance or exacerbation of many diseases, and thus may cause serious problems that may prevent further professional work (Strzelecka, 2021).

People's health also depends on themselves. Sometimes it is enough just to take care of one's physical activity, maintain a healthy weight, not abuse alcohol and not smoke cigarettes. All these factors contribute to the lifestyle of individuals and society as a whole. The analysis

of indicators related to the care of one's health also shows significant negligence of the new Member States in this respect. Countries at the end of the ranking (see Table 3) are often characterised by poor health indicators. Lack of physical activity outside of work affects as much as 84% of the Romanian population regardless of the study period, with the share of the country's population rating their health as good or very good exceeding the EU average. In comparison, in Sweden, which ranks first, the share of the population that does not spend time on physical activity was 23.8% in 2020 (0.8 p.p. less than in 2014), and a rating of their health as good or very good was marked by 76.5% of the population. According to Gavurova, Rigelsky and Ivankova (2020), the perception of health by individuals is very important. If people feel sick, their work efficiency is not optimal, the consumption of medicines increases and their quality of life decreases. In addition, the negative perception of health as a whole has an impact on the productivity of workers and, consequently, on the economic situation of countries.

Health is also influenced by diet and the associated weight of a person. Poor eating habits can lead to overeating and obesity, which can be treated as a chronic disease. The highest obesity rate (Y_{7D}) was for Croatia, located in typological group IV (64.8%), with other countries in this group also exceeding the EU average of 55.3%.

A study similar to the one included in this paper was conducted by Seke et al. (2013). They analysed 31 European countries and the statistical data (from Eurostat) related to 2011. According to the results, Norway and Iceland are the top two European countries in terms of public health sustainability, while Romania, Lithuania and Latvia, some of the newest EU member states, ranked the lowest. The results also show that the most important variables in the evaluated countries are: “years of healthy life at birth, women” ($r^2 = 0.880$), “years of healthy life at birth, men” ($r^2 = 0.864$), “rate of death due to chronic diseases, men” ($r^2 = 0.850$) and “years of healthy life of women aged 65 years” ($r^2 = 0.844$).

Similar conclusions are drawn by the research of Konarzewska (2020), who constructed a ranking for 28 EU countries using multi-criteria statistical analysis. The research results indicate that Sweden, the Netherlands, Ireland and Denmark are the closest to the implementation of SDG3. The worst situation is in Romania, Latvia, Lithuania and Bulgaria.

Verra et al. (2019) attempted to demonstrate differences in the implemented health and safety regulations of workplaces in the countries of the European Union. However, they did not limit themselves to health protection but also included health promotion measures. The data came from 40,584 companies in 2014. For the purposes of the survey, eight indicators were selected for analysis: the first three measured the more “traditional” health and safety system measures that are necessary to prevent physical harm, and the following three measured indicators that prevent broader psychosocial health problems in terms of addiction prevention (cigarettes, alcohol, drugs, among others), and two indicators focused on health promotion (promoting exercise at work, raising awareness of healthy eating). Each indicator determined how often employers introduced these occupational health and safety measures in their

companies. The study results showed that all Member States addressed the basic principles of occupational health and safety. The most significant differences were noted in the field of prevention of psychosocial problems and health promotion. It appears that psychosocial risks and health promotion are often included in national policies but are not consistently implemented by employers. EU countries must find ways to stimulate establishments to improve safety, health and well-being actively.

The assessment of the correlation between the promotion of human rights and health protection in 161 countries was conducted by Akgungor et al. (2019). A regression model showed that economic, social and cultural rights variables explained differences in health results. They classified countries using cluster analysis and found that those with high respect for economic, social and cultural rights had better health results.

Research and evaluation of health-related interventions usually end with external funding, regardless of whether the research tests the effectiveness of a new health promotion intervention or evaluates the effectiveness of a more comprehensive community-oriented programme (Scheirer, Dearing, 2011). Walugembe et al. (2019) consider how to support the sustainability of beneficial interventions to maximise limited resources, realise long-term public health outcomes, and not lose community support in a sustainable development setting.

The article by De Neve and Sachs (2020) examines the empirical links between achieving the Sustainable Development Goals (SDGs) and subjective well-being, which is one component of human health. Representative data for the whole world for the years 2016-2018 came from the Gallup World Poll survey, which is constantly surveyed by 160 countries representing about 98% of the adult world population. In the survey questionnaire, respondents were asked to evaluate their current life on a scale of 0-10, where 0 is the worst possible life, and 10 is the best. Research has shown that the overall correlation between SDGs and well-being is much lower in regions where the majority are developing countries. It turned out that only in Europe, Asia and the Americas there is a strong, statistically significant correlation between SDGs and well-being. The analysis of the world's regions in terms of their focus on achieving sustainable development goals has shown that in both Americas, health goals play the most important role in driving regional differences in well-being, whereas, for example, for Europe, these are economic goals and for sub-Saharan Africa social goals.

Governments in individual European countries have different approaches to health issues. Some countries have focused on solving problems with smoking (Joossens, Raw, 2006), while others prioritise preventive actions in reducing the incidence of certain diseases, e.g. cancer (Arbyn et al., 2010). Some governments have invested considerable resources to make their roads safe, while others have not (WHO, 2009). Mackenbach and McKee (2013) assessed the extent to which 43 European countries differed in the implementation of health policy in 10 different areas and used these differences to examine the role of political, economic and social determinants of health policy. They developed a set of 27 indicators in the field of smoking, alcohol consumption, nutrition, fertility, pregnancy and childbirth, child health,

infectious diseases, detection and treatment of hypertension, screening for cancer, road safety and air pollution. In exploratory regression analyses, they linked these indicators to the following six factors: national income, survival/self-expression values, democracy, government effectiveness, left-wing participation in government, and ethnic fractionation. Their findings show significant differences among European countries regarding health policy processes and indicators. Overall, Sweden, Norway and Iceland perform best and Ukraine, the Russian Federation, and Armenia perform worst. In Western Europe, some countries, such as Denmark and Belgium, are far worse off than their neighbours.

6. Conclusions

Sustainable development is now a priority issue for the lives and health of future generations. According to a study commissioned by the World Economic Forum, three out of four adults (74%) worldwide are aware of the United Nations Sustainable Development Goals (Tedeneke, 2019). The survey, conducted by the Ipsos Group, asked nearly 20,000 people aged 16-74 from 28 countries how well they know the SDGs and which SDGs they consider to be the most important. The following goals were rated highest: SDG2 – zero hunger, SDG6 – clean water and sanitation, SDG3 – good health and well-being, SDG7 – affordable and clean energy, and SDG14 – life below water. As one can see, the first three include the objective that is the subject of this publication.

In view of the significant and urgent challenges of sustainable development, there is growing interest among researchers, politicians and individuals in the issues of health protection and promotion in light of the SDG3 of the 2030 Agenda. Public and scientific debates in this area show that the threats of the modern world are being seriously addressed. An interdisciplinary approach is necessary, as this is the only way to succeed.

There is a global acceptance that health and social well-being are determined by many factors outside the health system, which include socioeconomic conditions, food and communication consumption patterns, demographic patterns, learning environments, family patterns, cultural factors and global environmental changes. In such a situation, efforts to promote and protect health should include strengthening the health system and action at the individual and community level. The negative effects of global climate change, a sedentary lifestyle, the increasing frequency of natural disasters, the financial crisis, threats to security, are increasing the challenges currently facing public health (Kumar, Preetha, 2012).

Following its values, the EU should strive to promote the prosperity, security and interests of all citizens, and sustainable development will have to constantly inspire the political decision-making process of the European Commission and guide the development of the post-EU2020 growth strategy (Molero et al., 2021).

Our research aimed to compare the situation in European Union countries from the point of view of how far they are from the targets of the 2030 Agenda for Sustainable Development formulated for Goal 3 – Ensure healthy lives and promote well-being for all at all ages. In both research periods (2014 and 2020), the best situation in terms of implementation of SDG3 was in the countries of Northern and Western Europe, with Sweden invariably leading the ranking. This country is characterized by a high level of stimulant indicators adopted for the study and a low level of indicators adversely affecting the studied phenomenon (destimulant). Over 76% of Sweden's residents rate their health as good or very good. The positions of the countries occupying the last positions in the table, i.e. Latvia (27th position) and Romania (26th position), did not change in the analyzed periods. These countries are characterized primarily by a low level of healthy life years at birth (Y_{1S}) and a high level of indicators related to mortality (Y_{4D} – standardized death rate due to tuberculosis, HIV and hepatitis by type of disease and Y_{5D} – standardized preventable and treatable mortality). The perception of health by the inhabitants of Latvia is associated with the unfavorable levels of most of the indicators adopted for the study, moreover, less than 50% of the country's population assesses their health as good or very good. In the case of Romania, the situation is quite different – the country, which takes a very unfavorable position due to the implementation of SDG3, due to the level of the Y_{2S} indicator (share of people with good or very good perceived health) was rated above the average for all Member States. It should be noted that the inhabitants of this country, among the EU countries, spend the least time on health-promoting physical activity, as evidenced by the highest level of the Y_{13D} indicator among the member states. This confirms that the perception of one's own health and lifestyle depends on many factors, e.g. environmental, cultural and socio-economic.

The research presented in this paper can serve as a starting point for further research on sustainable development indicators in the area of health promotion and protection. SDG3 should also be linked to other SDGs, especially those related to environmental risks and the fight against poverty.

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