

Health inequalities in Slovakia assessed by the Health Index: Unveiling regional disparities and their impact on the population

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Abstract

Health inequalities represent a significant social problem not only in the world but also in Slovakia. They are conditioned by several factors such as socio-economic status, geographic location, age, ethnicity and access to health care. Inequalities in the general health status of districts can be assessed using selected determinants. A composite indicator (Health Index) was used to quantitatively assess health inequalities in the districts. This Health Index consists of 8 assessment domains and 50 indicators at the district level (LAU1) in the Slovak Republic. We evaluated the data using the multi-criteria decision-making method (WSA method). The findings suggest that when districts are assigned different weights, changes occur in the health index values. Identifying problem regions is therefore very important. The health situation in Slovakia is not uniform and the results of the research showed differences between the West and the East. The districts located in the southern part of Slovakia, which achieved the lowest values of the index, can be included among the areas at risk in the context of the Health Index assessment. In order to mitigate them, it is necessary to improve access to health care, invest in prevention and improve the economic conditions of the population. It is also essential to propose possible solutions. These include improving access to preventive care and health education. The next step is reforms in the health system. These aim to reduce inequalities and improve public health.

Keywords: health inequalities, Health Index, WSA method, districts, Slovakia

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Introduction

According to the World Health Organization (2018), health inequalities refer to differences in health status as well as the distribution of health resources among different population groups. These disparities result from social factors, which may include, for example, access to education, educational attainment, employment status, income level, and gender or ethnicity. As defined by Global Health Europe (2009), the terms '*inequity*' and '*inequality*' are '*inequity and inequality*': these terms are sometimes confused but are not interchangeable. '*Inequity*' refers to avoidable inequities resulting from poor governance,

corruption or cultural exclusion, while '*inequality*' simply refers to the unequal distribution of health or health resources due to genetic or other factors or lack of resources. '*Inequity*' is often measured in terms of the inequality of health or resources, which is appropriate where one might reasonably expect equality. For example, there is no reason for differences in access to health resources between men and women within a country other than cultural prejudice and or a failure of governance, basic health services should be available to all citizens within a community according to need.

In line with ARAYA, M.C. *et al.* (2015), we can refer to health inequalities as regular

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disparities that have an impact on the social and economic costs not only of the individual but also of society. Any measurable aspect of health that differs between individuals or between socially relevant groups can be termed health inequality. This is an unfair disparity, since in an ideal world everyone should have an equal opportunity to reach their full health potential. At the same time, no one should be disadvantaged in achieving it if the disadvantage can be avoided (HÜBELOVÁ, D. *et al.* 2021a). Health inequalities are systematic differences in health between groups of people based on their social status. However, not every difference in the health status of a population automatically implies inequality – it becomes inequality when it is associated with characteristics that make it inequitable. Societies with significant health inequalities that affect broad segments of the population tend to face wide health inequalities. Conversely, if health inequalities affect only a small group (for example, benefit recipients, ethnic minorities or migrants), overall inequalities within the population may be relatively small, even if contrasts between these groups are stark (MCCARTNEY, G. *et al.* 2013). SCHOON, P.M. and KRUMWIEDE, K. (2022) point out that health inequalities that could be prevented by appropriate measures are the result of broader social inequalities. Given inequalities are shaped from birth and are significantly influenced by socio-economic factors throughout the life course. The conditions in which people are born, grow up, live, work and age are fundamental to their health. The realities of life are largely determined by the way in which finance, power and resources are distributed at national and local levels. At the same time, health inequalities are caused by government policies affecting the quantity, quality and distribution of determinants (CHIAVARINI, M. *et al.* 2014).

One of the key aspects of tracking health inequalities is the geographical space in which the disparities are analysed. JUTZ, R. (2020) focuses in his paper on the comparison of health inequalities between post-communist

countries of Eastern Europe and Western European countries. The study points out that the communist regime laid the foundations for different levels of health inequalities, especially in terms of education, in Eastern and Western Europe. Past research has shown that health inequalities within countries are closely related to welfare state systems. The structure and institutions of social security not only shape the daily lives of the population, but also have a major impact on socio-economic health inequalities. Factors such as access to health care, education levels, employment and living conditions are directly influenced by welfare state policies, which can either mitigate or exacerbate disparities. CHELAK, K. and CHAKOLE, S (2023) stress the importance of reducing health inequalities, with the key to addressing this being the elimination of the unequal distribution of power, finance and resources. The authors also highlight the importance of everyday living conditions, which can be influenced through the social determinants of health, as their impact on health status is considerable.

Eliminating health inequalities requires appropriate decisions from the economic and social policy environment, which influence a wide range of factors – employment, education, socio-economic status, social support networks, health policy and access to health care. Targeted interventions in these areas can make a significant contribution to improving community health and enhancing equity in health care. A wealth of research confirms that avoidable systematic health inequalities are present not only between societies, but also within them, and at all hierarchical levels. This is amply documented in the literature on the subject. As examples, some of the works of (GRAHAM, H. 2004; OTTERSEN, O.P. *et al.* 2014; CABRERA-BARONA, P. *et al.* 2015; AGENOR, M. 2020).

Theoretical aspects

Population health is closely related to the socio-economic organisation of society, which

forms the basis for effective policies to improve it. While it is important to ensure quality and efficient health services, health goes beyond health care. Government and private sector policies at all levels significantly influence the health status of the population. Health policy decisions should be based on the best available evidence, as should policies on the social determinants of health. A wide range of factors are addressed, such as the impact of early life, social gradients, job insecurity, psychosocial environment, transport, social support, food policy, poverty, social exclusion, ethnic inequalities, housing. These factors shape health inequalities and understanding them is key to developing effective strategies to mitigate them (MARMOT, M. and WILKINSON, R. 2005). According to MARMOT, M. (2010), a combination of poor social conditions, bad government policies and inequitable distribution of wealth in society causes health disparities among people. Social and economic disparities are an inseparable reality in every country. However, these differences should not cause disease, misery, poverty and suffering to the extent that we are seeing today. It is unjust, however, not uncontrollable. And that is the essence of health inequalities.

Public health research and action is built on a shared understanding of 'health' and the related concept of 'health inequalities'. The literature has discussed differences in how these concepts are understood and defined and how this translates into measurement, analysis and interpretation. The assumptions, emphasis and values underlying the use of different approaches are less often explicit (KRIEGER, N. 2011). WEINSTEIN, J.N. *et al.* (2017) concur with the definition of health inequalities as they, like others, consider them as systematic differences that certain population groups must overcome to achieve optimal health. This leads to inequitable and avoidable disparities in health outcomes. In their publication, they explain the interconnectedness between health inequalities, structural inequalities and social determinants of health. The authors state that the social,

environmental, economic and cultural determinants of health create the conditions in which structural inequalities produce health inequalities. Thus, the point is that structural inequalities, which represent a variety of personal, interpersonal, institutional, and systemic drivers. For example, racism, gender discrimination, class, adaptive capacity, etc., which are important for the equitable distribution of health opportunities and outcomes.

Like other authors, ADLER, N. *et al.* (2007) confirm that the relationship between health and socio-economic resources is complex because they influence each other. The imaginary rung (the level of our socio-economic status) we are on affects our health, and our health in turn affects our ability to reach higher levels. Regarding perceptions of health inequalities in the United States, DICKMAN, S.L. *et al.* (2017) explain that the deepening of economic inequality in the US is accompanied by widening health disparities. They also argue that a health care system that could reduce health disparities often instead exacerbates them. Among the key findings, the authors note that the gap in life expectancy is widening among populations with different incomes, which in practice means that the wealthiest residents of the United States are living 10 to 15 years longer (10.1 years for women, 14.6 years for men) than the poorest population.

The World Health Organization talks about the fact that not only poverty itself causes health inequalities, but in fact the social meaning of disadvantage plays a role if you are poor, unemployed, socially excluded or otherwise stigmatized (SCHOLZ, N. 2020). According to DOCTEUR, E. and BERENSON, R.A. (2014) a report by the European Commission identifies five broad challenges that need to be addressed in order to minimise health inequalities within the member states of the European Union. These challenges are (improving the evidence base to assist policy making, addressing the social determinants of health, ensuring universal access to health care, promoting and educating for healthy lifestyles, strengthening health governance).

In their study, MACKENBACH, J.P. *et al.* (2018) analyse trends in health inequalities in 27 European countries. They explain that inequalities in mortality and morbidity are a highly persistent phenomenon among socio-economic groups. This is despite the fact that they have been the focus of public health policy in many countries. They analysed health trends by education in European countries, paying particular attention to the possibility of breaking trends that may have been affected by the 2008 financial crisis. Their research found that in Western Europe, inequalities in mortality have decreased due to a decline in overall mortality, both among lower- and higher-educated populations. Most Western European countries have been experiencing such a decline in mortality for several decades, influenced by steadily improving living standards, advances in prevention, particularly through changes in health-seeking behaviour, and health care. Advances in prevention have also resulted in a more rapid decline in mortality from smoking-related diseases and coronary heart disease. On the other hand, the high number of healthy life years in Malta can be attributed to factors such as high life expectancy, a well-functioning health care system, a reduction in premature deaths (especially from cardiovascular disease and cancer), but also to ongoing efforts to address public health challenges and an improving health system (AZZOPARDI-MUSCAT, N. *et al.* 2017). Health disparities across Europe between social groups have also been documented in another study by SALMI, L.-R. *et al.* (2017). The summary and results of the Addressing Inequalities in Regions (AIR) project, which identified illustrative interventions and policies developed in European regions aimed at reducing inequalities at the primary health care level.

As with poverty measures, health inequalities can be assessed in absolute or relative terms. This may be important when there are secular trends in the average health of the population (e.g., a downward trend in the average may increase relative inequalities even if absolute disparities remain stable).

Consequently, methods for determining health inequalities vary depending on which inequality is of most interest. Health inequalities persist over time and have been found in most countries where they have been studied (MCCARTNEY, G. *et al.* 2019). According to HÜBELOVÁ, D. *et al.* (2023), several classifications of the determinants of health inequalities and their impact on population health are known. As an example, we refer to the Conceptual Framework for Action on Social Determinants of Health (SOLAR, O. and IRWIN, A. 2010). The impact of different factors on population health has been identified as follows: genetic basis accounts for 10–15 percent, health and health care accounts for 10–15 percent, environment accounts for 20 percent and lifestyle factors account for 50 percent (MARMOT, M. and WILKINSON, R. 2005). In addition, the County Health Ranking Model (UW Population Health Institute, 2020) uses the following proportions: health and health care contribute 20 percent, environment contributes 10 percent, social and economic factors contribute 40 percent, and lifestyle factors contribute 30 percent. According to the EURO-HEALTHY project, the Population Health Index (PHI) is developed for EU countries at NUTS2 level (the regional level unit for the application of regional policies) and for 10 selected metropolitan areas (EURO-HEALTHY Consortium 2017). The results show that systematic spatial inequalities persist in Europe at NUTS2 level. In a spatial context, a study conducted in France (FAYET, Y. *et al.* 2020) is a geographic classification of health studies (GeoClasH). It is inspiring and stimulating due to its focus on the municipal scale when considering variables from the physical environment, social characteristics of the population and spatial accessibility to health care.

According to PEARSON-STUTTARD, J. and DAVIES, S.C. (2025), the recommendation for the CHI (Composite Health Index) was based on two themes: health as a basic economic asset and persistent health inequalities, particularly in terms of healthy life expectancy. Both themes have become more

pressing since the COVID-19 pandemic, as economic inactivity and health inequalities have worsened. All data used in the Health Index come from publicly available sources, usually the Office for National Statistics (ONS) or other government departments. The purpose of the ONS Health Index is to measure the state of health within communities and provide detailed information using 56 indicators in three domains: healthy places (the wider determinants of health), healthy lives (health-related behaviours) and healthy people (health outcomes). The ONS Health Index revealed substantial differences in health status over time and geography. Although the national score improved from 2020 to 2021, it remained lower than before the pandemic. Health inequalities between communities have also deepened. Objective identification and monitoring of health inequalities is essential at two levels: (National Academies of Sciences..., 2016) to improve the average quality of health of the population and to reduce inequalities in achieving good health themselves. Creating a quality and sustainable environment and an adequate level of economic and social development simultaneously promotes good health and social justice (COSTA, C. *et al.* 2019).

Data and method

To assess health inequalities in Slovakia, we used a composite indicator – the Health Index. The Health Index includes 47 health determinants and indicators. One of the key aspects in selecting the indicators was the availability of data in public databases over time and at the required geographic level (79 districts of the Slovak Republic). Another crucial aspect was determining the scope of available indicators (health determinants, health status, health care, etc. (BRAVE-MAN, P. 1998). The overall Health Index is composed of eight areas (1. Economic conditions and social protection, 2. Education, 3. Demographic indicators, 4. Environmental conditions, 5. Individual living conditions,

6. Road safety and crime, 7. Health and social care resources, and 8. Health status). It highlights spatial differentiation in health inequalities based on a complex set of relevant determinants and health indicators. Through this index, we can track spatial differentiation using 47 indicators, expressed as a single value – the Health Index. The list of indicators is documented in *Table 1*.

The data were obtained from publicly available databases, including the Statistical Office of the Slovak Republic, the National Health Information Centre, the Ministry of Labour, Social Affairs and Family of the Slovak Republic, the Ministry of the Interior of the Slovak Republic, the Slovak National Emission Information System, and the 2021 Population and Housing Census. The data cover the years 2021 and 2022. The Health Index is a mathematical combination of variables reflecting several selected indicators (NARDO, M. *et al.* 2005). The method used to calculate the Health Index was a multi-criteria variance evaluation method, specifically the Weighted Sum Approach (WSA). The WSA method is based on the principle of maximizing utility. It also assumes linearity and maximization of all partial utility functions, which are obtained by normalizing the original input data. The higher the value of the Health Index, the more favourable the situation in the region. The calculations were performed using MS Excel, Microsoft Corporation, Redmond, DC, USA. We approached the Health Index values for individual districts in Slovakia in two ways. In the first case, each of the eight areas had equal importance with a weight of 1 (WSA method without weights). In the second case, each of the eight areas had a specific weight (WSA method with weights). The weights of the areas were adopted according to the methodology by (HÜBELOVÁ, D. *et al.* 2021b). Their methodology explains how to create and determine the significance of each area, which was based on an interdisciplinary expert assessment using the Delphi method.

A total of ten independent experts from various scientific fields (sociology, demog-

Table 1. Description of the research group area 1–8

Area	Theme	Description
1. Economic condition	Employment rate	<i>Unemployed persons (total)</i> : number of available jobseekers aged 15–64 compared to persons of the same age, %
		<i>Unemployed persons (men)</i> : number of available jobseekers aged 15–64 compared to persons of the same age, %
		<i>Unemployed persons (women)</i> : number of available jobseekers aged 15–64 compared to persons of the same age, %
		<i>Jobseekers aged 50–64</i> : number of jobseekers aged 50–64 compared to persons of the same age, %
		<i>Jobseekers aged 15–24</i> : number of jobseekers aged 15–24 compared to persons of the same age, %
2. Education	Educational structure	<i>Jobseekers with an unemployment duration of 12 months or more</i> : number of jobseekers with an unemployment duration of 12 months or more compared to the total number of jobseekers, %
		<i>Jobseekers with basic education</i> : number of jobseekers with basic education compared to the total number of jobseekers, %
		<i>Jobseekers with secondary vocational education without completing a leaving exam (incl. apprentices)</i> : number of jobseekers with secondary vocational education without completing a leaving exam (incl. apprentices compared to the total number of jobseekers, %
		<i>Population with basic and incomplete education</i> : share of persons with basic and incomplete education aged 15 and over in relation to persons of the same age, %
		<i>Population with university education</i> : share of persons with university education aged 15 and over in relation to persons of the same age, %
3. Demographic situation	Migration	<i>Foreigners by the most frequent citizenships</i> : sum of the number of most frequent citizenships of foreigners in relation to the whole population, %
	Aging	<i>Age index</i> : number of persons aged 65 and over compared to the number of persons aged 0–14, %
	Urbanization	<i>Level of urbanization</i> : share of population living in cities, %
	Ethnic structure	<i>Roma population</i> : share of population with Roma nationality, %
		<i>Annual average concentration of suspended particular matter PM_{2.5}</i> : in µg/m ³
4. Environmental conditions	Air quality	<i>Annual average concentration of suspended particular matter PM₁₀</i> : in µg/m ³
		<i>Annual average concentration of benzol[alpyrene]</i> : in ng/m ³
		<i>Annual average NO₂ concentration</i> : in µg/m ³
		<i>Annual average benzene concentration</i> : in µg/m ³
		<i>Average living space per person</i> : m ²
5. Individual living conditions	Living conditions	<i>Heating method</i> : share of dwellings heated by electricity or gas to dwellings heated by solid fuels; coefficient
	Technical infrastructure	<i>Share of municipalities in the district with connection to the sewerage system terminated by a WWTP</i> , %
		<i>Total traffic accidents</i> : total number of traffic accidents in relation to the total population; per 1000 inhabitants
	Traffic accidents	<i>Total traffic accidents under the influence of alcohol</i> : number of traffic accidents under the influence of alcohol relative to the total population; per 1000 inhabitants
		<i>Deaths due to road accidents</i> : number of deaths due to road accidents relative to the number of inhabitants; per 100,000 inhabitants
6. Road safety and crime	Crime	<i>Deaths due to assault (attack)</i> : number of deaths due to assault (attack) relative to number of inhabitants; per 100,000 inhabitants
		<i>Registered offenses</i> : number of registered offenses in relation to the total population; per 1000 inhabitants

Table 1. Continued

Area	Theme	Description
7. Sources of health and social care	Health care capacities	<i>Physicians in healthcare facilities</i> : number of physicians relative to the total population; per 1000 inhabitants <i>Hospital beds</i> : number of hospital beds in relation to the total population; per 1000 inhabitants REGIONS (identical value of the region level assigned to the districts of the respective region)
	Social care capacities	<i>Place in social service facilities</i> : number of places in social services facilities relative to the total population; per 1000 inhabitants REGIONS (identical value of the region level assigned to the districts of the respective region) <i>Life expectancy at birth (men)</i> ; year <i>Life expectancy at birth (women)</i> ; year <i>Total mortality</i> : total number of deaths relative to the total population; per 100,000 inhabitants <i>Male mortality</i> : number of male deaths relative to total male number; per 100,000 inhabitants <i>Infant mortality</i> : number of deaths within 1 year relative to total number of live births; per 1000 live births <i>Neonatal mortality</i> : number of deaths within 28 days of birth versus number of live births, per 1000 live births <i>Deaths from infectious and parasitic disease</i> : number of deaths from infectious and parasitic disease relative to the total population; per 100,000 inhabitants <i>Deaths from circulatory system diseases</i> : number of deaths from circulatory system diseases relative to the total population; per 100,000 inhabitants
8. Health status	Life expectancy and mortality structure	<i>Deaths from respiratory diseases</i> : number of deaths from respiratory diseases relative to the total population; per 100,000 inhabitants <i>Deaths from malignant neoplasms</i> : number of deaths from malignant neoplasms relative to the total population; per 100,000 inhabitants <i>Deaths from gastrointestinal diseases</i> : number of deaths from gastrointestinal diseases relative to the total population; per 100,000 inhabitants <i>Deaths from other causes</i> : number of deaths from other causes relative to the total population; per 100,000 inhabitants <i>Intentional self-harm (men)</i> : number of men who died as a result of self-harm relative to the total number of men; per 100,000 inhabitants <i>Intentional self-harm (women)</i> : number of women who died as a result of self-harm relative to the total number of women; per 100,000 inhabitants <i>Death due to liver disease</i> : number of deaths from liver disease (alcoholic, toxic, cirrhosis, chronic and other inflammations and diseases) relative to the total population; per 100,000 inhabitants <i>Death due to smoking tobacco</i> : number of deaths due to smoking tobacco (malignant neoplasm of larynx, trachea, bronchi and lungs) relative to the total population; per 100,000 inhabitants <i>Diabetes mellitus deaths</i> : number of deaths due to diabetes mellitus relative to the total population; per 100,000 inhabitants

Source: Authors' own research and processing.

raphy, environmental science, medicine and public health, law) and experts from practice (health policy, public health support, preventive medicine) related to population health anonymously assigned a weight (significance) to each area (Table 2). The areas were always evaluated as a whole, meaning the weight of individual areas was not influenced by the number of included indicators. The weights of the areas were determined through a questionnaire, and the experts' opinions were refined through a three-round evaluation (HAN, H. *et al.* 2012). The Health Index in the Slovak population and its spatial differentiation will be evaluated in the light of the theoretical background and the appropriately chosen methodological approach.

The data used in this study relate to 47 indicators, divided into 8 different areas. Each of the examined areas contains between 2 and 17 indicators (Table 3).

Methodologically, we divided the creation of the study into three phases. In the first phase, we obtained the assessment of districts for each area separately (with equal

weights for indicators within the areas) using the WSA method. In the second phase, the same method was applied to evaluate all eight areas together (first with equal weights for all eight areas, and then with different weights assigned by a group of experts). The overall result of our evaluation was the creation of the Health Index for individual districts in Slovakia. In the third phase, we graphically represented the Health Index values on a map of Slovakia, dividing them into clusters and identifying spatial disparities. For the evaluation, we used the Weighted Sum Approach (WSA), a method based on maximizing utility. This method is one of the most frequently used in this field. It is based on constructing a linear utility function on a scale from 0 to 1. The worst variant for a given indicator will have a utility of zero, while the best variant will have a utility of one. Other variants will have a utility between these two extreme values (KAMPF, R. 2002).

According to FRIEBELOVÁ, J. and KLICNAROVÁ, J. (2007), the ideal variant H with evaluation $(h_1, h_2, \dots, h_n)$ and the baseline variant D with evaluation $(d_1, d_2, \dots, d_n)$ must first be determined. The utility of the ideal variant is 1, and the baseline variant is 0. The resulting utilities for specific variants range between these values. Furthermore, a standardized matrix R is created, whose elements are obtained using the formula:

$$r_{ij} = \frac{y_{ij} - d_j}{h_j - d_j} \tag{1}$$

where r_{ij} represents the standardized value of the i -th variant and the j -th indicator.

For each variant, the overall utility of the i -th variant, $u(y_i)$, is calculated as a weighted sum of partial utilities and their corresponding weights, where v_j is the weight of the j -th indicator:

$$u(y_i) = \sum_{j=1}^k v_j \cdot r_{ij} \tag{2}$$

Table 2. Areas assessed in the Health Index and their associated weightings

No	Area	Weight
1	Economic conditions and social protection	0.19
2	Education	0.18
3	Demographic indicators	0.08
4	Environmental conditions	0.14
5	Individual living conditions	0.09
6	Road safety and crime	0.04
7	Health and social care resources	0.10
8	Health status	0.20

Source: Authors' own research and processing.

Table 3. Basic description of compared areas

No	Area	Number of criteria
1	Economic conditions and social protection	8
2	Education	2
3	Demographic indicators	4
4	Environmental conditions	5
5	Individual living conditions	3
6	Road safety and crime	5
7	Health and social care resources	3
8	Health status	1

Source: Authors' own research and processing.

In accordance with ALINEZHAD, A. and KHALILI, J. (2019), each indicator f_j (denoted as A_j^+) represents the highest value of the indicator, $A_j^+ = \max y_{ij}$, and A_j^- represent the lowest value of the indicator, $A_j^- = \min y_{ij}$. Based on the data y_{ij} for each alternative (in our case, district) a_i and each indicator f_j , we calculate the standardized value r_{ij} :

$$r_{ij} = \frac{y_{ij} - A_j^-}{A_j^+ - A_j^-} \quad (\text{formula A1})$$

$$r_{ij} = \frac{A_j^+ - y_{ij}}{A_j^+ - A_j^-} \quad (\text{formula A2})$$

The final ranking is based on utility – the higher the value, the better it is:

$$u(a_i) = \sum_{j=1}^k v_j \cdot r_{ij}, \forall i = 1, \dots, p. \quad (3)$$

Results

In this section, we will describe the steps we followed in calculating the utility in our study. As an example, we will use the Area 2 (Education), which consists of two indicators (criteria): 2_1 Population with basic education (%) and 2_2 Population with higher education (%). The evaluation using WSA starts with the data matrix Y (Table 4), where the lowest (minimum) and highest (maximum) values are found. The use of formula A2 applies to the first criterion, which we want to minimize, and the use of formula A1 applies to the second criterion, which we want to maximize. Next, the matrix is standardized according to the formula r_{ij} . For example, for the district Bratislava I, the standardized value for the indicator 2_1 is calculated as $(40.23 - 2.82) / 37.41 = 1.000$. The best district has a value of 1 (in the case of indicators 2_1 and 2_2, this is the district Bratislava I, as shown in Table 5). Next, an equal weight (in this case, $1/2$) is assigned to each indicator, and a weighted matrix is calculated (see Table 5). Finally, the overall utility for each district is computed as the sum of the val-

Table 4. Data for Area 2, selected districts – Education

Data (Y matrix)			
No.	District	Crit. 2_a	Crit. 2_b
1	Bratislava I	2.82	55.41
2	Bratislava II	7.80	30.78
3	Bratislava III	5.92	35.96
4	Bratislava IV	5.83	37.52
5	Bratislava V	7.13	31.43
...	...	15.78	16.73
50	Lučenec	19.65	10.81
51	Poltár	26.52	7.07
...	...	17.19	11.88
78	Spišská Nová Ves	16.08	11.16
79	Trebišov	18.19	9.02
–	Crit. type	min	max
–	minimum A_j^-	2.82	5.90
–	maximum A_j^+	40.23	55.41
–	max-min	37.41	49.51
–	crit. weights v_j	0.50	0.50

Source: Authors' own research and processing.

Table 5. Normalized matrix for Area 2 – selected districts

Normalized matrix R (r_{ij} values)			
No.	District	Crit. 2_a	Crit. 2_b
1	Bratislava I	1.0000	1.0000
2	Bratislava II	0.8670	0.5025
3	Bratislava III	0.9172	0.6072
4	Bratislava IV	0.8848	0.6386
5	Bratislava V	0.88.48	0.5158
...	...	...	...
50	Lučenec	0.5502	0.0992
51	Poltár	0.3665	0.0237
...	...	...	...
78	Spišská Nová Ves	0.6457	0.1064
79	Trebišov	0.5891	0.0631

Source: Authors' own research and processing.

ues in the row of Table 5 (Table 6). This result from the first phase is used as input for the second phase, where the same steps are carried out for the eight areas (treated as indicators). Subsequently, we are able to determine the Health Index value for each district of Slovakia.

The Health Index will be spatially analysed at the level of districts of Slovakia. The spatial breakdown of Slovakia is shown in Figure 1.

One important step was to identify the key determinants and indicators of health positions that underlie health inequalities. We

Table 6. Results of WSA for Area 2 (weighted matrix and utility of selected districts)

Weighted matrix				
No.	District	Crit. 2_a	Crit. 2_b	Utility u(a)
1	Bratislava I	0.5000	0.5000	1.0000
2	Bratislava II	0.4335	0.2513	0.6848
3	Bratislava III	0.4586	0.3036	0.7622
4	Bratislava IV	0.4424	0.2579	0.7791
5	Bratislava V	0.3399	0.0780	0.4178
...	...	...	...	...
50	Lučenec	0.2581	0.0137	0.3028
51	Poltár	0.2800	0.0316	0.3116
...	...	...	...	...
78	Spišská Nová Ves	0.2247	0.0172	0.2419
79	Trebišov	0.2179	0.0063	0.2243

Source: Authors’ own research and processing.

analysed the districts that we deliberately selected based on the highest and lowest health attainment values calculated by the WSA method (Table 7). We used a decomposition of the Health Index into domains to identify key determinants and indicators (outcomes) of community health that reflect positive and negative inequalities (Table 8). A more detailed analysis of the results was carried out for the districts, which were assigned different weights. Within the domains, we specified sub-indicators. Decomposing first, we present a comparison of the results of all

domains by districts with a high value of the Health Index WSA calculated with weights (districts – Bratislava I, Bratislava IV, Senec, Bratislava V, Košice I).

The main contributors to the positive results for these districts include Area 2 (education; weight 0.18) and Area 8 (health; weight 0.20). In Area 2, education is characterised by an above average proportion of people with a university degree and a low proportion of people with incomplete or primary education. In Area 8, health conditions

are associated with above-average life expectancy and below-average overall standardized mortality, as well as below-average mortality by underlying causes of death, including deaths caused by tobacco smoking and diabetes mellitus. In Senec district, the results are also favourable in Domain 3 (demographic conditions; weight 0.08) and Domain 8 (health status; weight 0.8).

In Domain 1, the districts of Bratislava I, Bratislava IV and Bratislava V scored particularly favourably on the economic conditions and social protection index (Figure 2). These

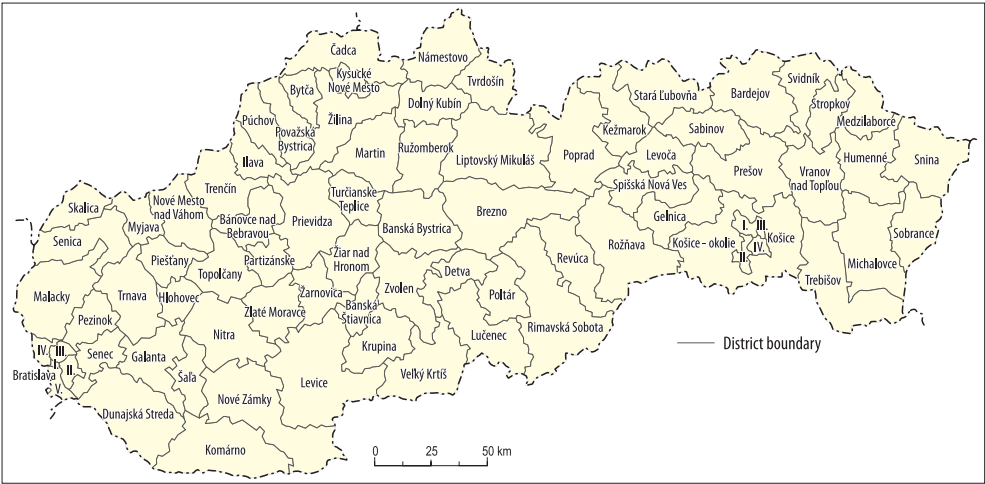


Fig. 1. Regional division of Slovakia. Source: Authors’ own processing.

Table 7. WSA (Weight 1) and WSA (different weightings)

No.	WSA (Weight 1)		WSA (different weightings)	
	District	Health Index	District	Health Index
1	Senec	0.71	Bratislava I	0.82
2	Bratislava I	0.70	Bratislava IV	0.74
3	Bratislava V	0.68	Senec	0.73
4	Košice I	0.67	Bratislava V.	0.73
5	Košice IV	0.67	Košice I	0.72
75	Trebišov	0.41	Trebišov	0.38
76	Sobrance	0.40	Medzilaborce	0.37
77	Rožňava	0.38	Rožňava	0.35
78	Rimavská Sobota	0.35	Rimavská Sobota	0.31
79	Revúca	0.32	Revúca	0.30

Source: Authors' own research and processing.

districts benefited from the dynamic economic environment of the capital city, which is characterised by a high concentration of investment, a well-developed business sector and a wide range of employment opportunities. The average unemployment rate in these districts was significantly lower than the national average, reflecting the stable economic base and high level of employment. In the capital Bratislava and in the Košice I

district, we observe unfavourable results in area 3, which includes demographic indicators (with a weight of 0.08). This negative trend is due to the current demographic situation, characterised by declining birth rates, an ageing population and an increasing dependency index, which points to a growing proportion of economically inactive residents. On the contrary, Senec district maintains a favourable position in this area. This development is mainly the result of above-average birth rates and high immigration rates. The inflow of new inhabitants is closely linked to the strong suburbanisation process that has been observed in the region for a long time. Senec benefits from its proximity to Bratislava, while the attractiveness of the district is enhanced by the availability of housing, quality infrastructure and favourable conditions for family life.

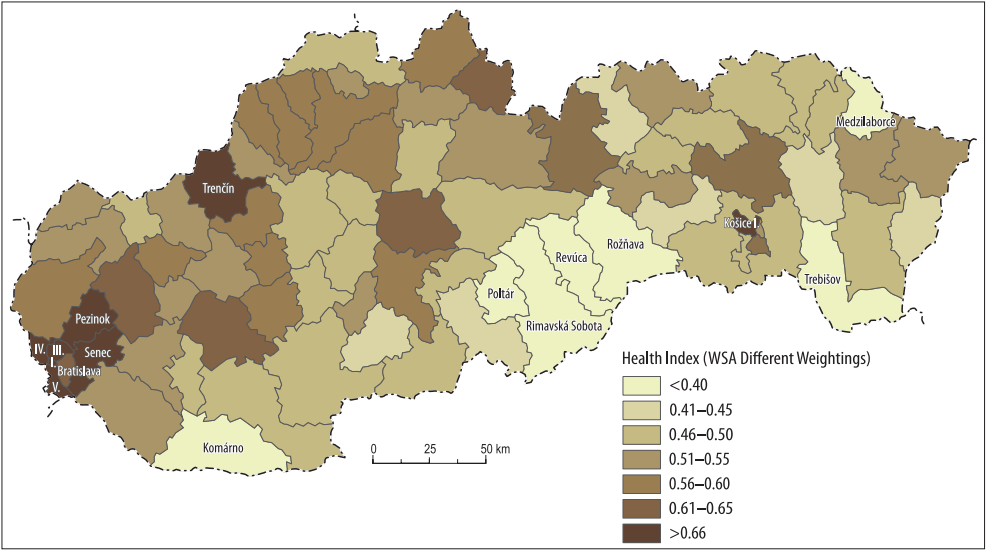


Fig. 2. Spatial differentiation based on the calculation of the Health Index values using equal for the different areas – WSA method (2021–2022). The higher Health Index values are indicated by the darker colours of the districts. Source: Authors' own research and processing.

Table 8. Basic description of compared areas by Health Index WSA Different Weightings

WSA (Different Weightings) Determinants of Health										Health Indicators									
Area 1				Area 2				Area 3		Area 4		Area 5		Area 6		Area 7		Area 8	
Health Index		Economic conditions and social protection		Education		Demographic indicators		Environmental conditions		Individual living conditions		Road safety and crime		Health and social care resources		Health status			
District	Rank	Index value	Rank	Index value	Rank	Index value	Rank	Index value	Rank	Index value	Rank	Index value	Rank	Index value	Rank	Index value	Rank	Index value	
Bratislava I	1	0.822	1	0.941	1	0.954	54	0.491	39	0.989	3	0.781	79	0.461	3	0.445	4	0.784	
Bratislava IV	2	0.741	5	0.911	2	0.779	77	0.324	48	0.981	7	0.569	23	0.831	73	0.153	2	0.838	
Senec	3	0.736	9	0.896	14	0.482	1	0.948	11	0.996	24	0.410	16	0.860	79	0.073	1	0.874	
Bratislava V	4	0.735	2	0.927	4	0.703	75	0.381	23	0.993	1	0.895	40	0.781	48	0.256	8	0.737	
Košice I	5	0.725	24	0.804	5	0.688	76	0.347	8	0.997	4	0.646	68	0.629	1	0.723	13	0.708	
Poltár	73	0.399	66	0.424	76	0.195	16	0.594	18	0.995	72	0.166	3	0.944	68	0.191	67	0.514	
Komárno	74	0.383	45	0.687	75	0.221	58	0.479	62	0.963	74	0.152	11	0.902	58	0.218	78	0.362	
Trebišov	75	0.380	72	0.354	40	0.326	34	0.537	29	0.992	75	0.137	37	0.783	41	0.262	73	0.472	
Medzilaborce	76	0.370	73	0.330	53	0.286	73	0.428	12	0.996	59	0.244	36	0.787	2	0.583	79	0.349	
Rožňava	77	0.351	76	0.277	37	0.342	38	0.526	37	0.989	68	0.210	60	0.684	15	0.326	77	0.413	
Rimavská Sobota	78	0.306	79	0.178	62	0.263	51	0.494	43	0.985	77	0.118	47	0.742	36	0.271	71	0.492	
Revúca	79	0.302	78	0.086	59	0.276	59	0.478	51	0.977	71	0.174	73	0.587	54	0.232	74	0.463	

Source: Authors' own research and processing.

The Bratislava I district shows unfavourable results in area 6, which includes road safety and crime index. This negative trend is primarily influenced by an above-average number of traffic accidents, which are a consequence of high traffic intensity and heavy traffic in the city centre. At the same time, there is an increase in the number of registered crimes, with property crime, pick-pocketing and vandalism being among the most common, which are typical of busy urban areas.

Domain which focuses on individual living conditions (with a weight of 0.09), shows a similar regional distribution as the other socio-economic indicators. The districts of Slovakia's two largest cities, Bratislava I and Košice I, continue to maintain the best scores. Their favourable position is the result of a higher standard of living, the availability of quality housing, good civic amenities and a wide range of services in health care, education and culture. However, despite these positives, certain challenges remain in these areas, such as the high cost of housing, differences in income levels of residents. On the other hand, in Domain 7, which includes health and social care resources (with a weight of 0.10), Bratislava IV and Bratislava V districts perform less favourably compared to other Bratislava districts. The main reason for their weaker position is the low bed capacity of hospitals, which is insufficient to cover the needs of the growing population in these areas.

Area 4, which focuses on ecological conditions (with a weight of 0.14), shows rather unfavourable results for this group of districts,

mainly due to above-average air pollution levels. This negative trend is due to high urbanisation rates, dense traffic, industrial activity and increased emissions, which affect air quality and the overall environment (scorecard).

The same methods of decomposing and comparing the results of individual areas were also applied to the districts with low Health Index scores, which include Revúca, Rimavská Sobota, Rožňava, Medzilaborce and Trebišov. The analysis was again conducted using the WSA method with assigned weights, which allowed for a more accurate assessment of the factors influencing the health status of the population in these regions. This group of districts is associated with unfavourable results of the Health Index assessment. The most pronounced negative impacts are seen in Domain 1 (economic conditions and social protection; weight 0.19), Domain 8 (health; weight 0.20) and Domain 2 (education; weight 0.18). These districts are among the weakest economically in the country, characterised by high unemployment rates and low average wages, which limit the living conditions of their inhabitants. The low level of education is also a significant problem, with a high proportion of residents having only primary education. This trend is largely influenced by the socio-economic situation, as well as by the higher representation of the Roma national minority. The health situation in these regions is also unfavourable, with above-average mortality rates and some causes of death, such as diseases of the circulatory system. This situation is exacerbated by the lack of access to healthcare, the limited number of doctors and healthcare facilities, and the low level of preventive care.

Other domains, namely Domain 3 (demographic indicators; weight 0.08), Domain 4 (environmental conditions), Domain 6 (road safety and crime index) and Domain 7 (health and social care resources), could not be clearly assessed in the interpretation of the results for the identified group of districts with the lowest Health Index values. For example, in Domain 3 (demographic indicators), the index is characterised by a wide range of val-

ues, with some districts, such as Trebišov and Rožňava, achieving higher values due to a younger or average age structure of the population. On the contrary, the Medzilaborce district shows a low value of the demographic index, which is due to an above-average age index and a significant migration loss, as the younger population often leaves for better economic opportunities in other regions or abroad. These differences suggest that demographic factors have a different impact on the overall Health Index in different districts (see *Figure 2*).

The WSA assessment method with equal weights spatially identifies the districts of Slovakia that achieved the highest Health Index values, which include Bratislava I, Bratislava IV, Bratislava V, Senec, and Košice I. In contrast, the districts located in the southern part of Slovakia – Rožňava, Revúca, and Rimavská Sobota – showed the lowest Health Index values. Higher Health Index values are indicated by darker shading, reflecting a more favourable situation. Regions with a high Health Index are characterized by positive regional differences, such as a high proportion of university graduates, positive net migration, and low unemployment rates. Conversely, regions with a low Health Index display negative regional disparities, including high unemployment, a low share of university-educated residents, negative net migration, and high infant mortality. These regions also report the presence of socially excluded communities with an ethnic minority (Roma) and a higher proportion of residents with a lower socio-economic status.

A very similar situation is also manifested in area 4 (environmental conditions; weight 0.14), where, however, the districts of Revúca and Medzilaborce show significantly different values. While Revúca scores above average on the pollution index, Medzilaborce, on the other hand, shows favourable environmental conditions. In the case of Revúca, the unfavourable environmental quality is mainly influenced by industrial activity, the historical burden of metallurgy and mining, as well as the high production of emissions from

local industrial enterprises. On the contrary, the favourable situation in Medzilaborce is the result of several factors such as the low level of industrial activity, lower population density and extensive forest cover in the vicinity, which contribute to better air quality.

The results in Domain 5 (individual living conditions; weight 0.09) show a similar trend, with a low index of living conditions in these districts, which is mainly the result of several factors. One of the main reasons for this is the low proportion of households heating their homes with electricity or gas, leading to a greater reliance on solid fuels such as wood or coal.

In Domain 7 (health and social care; weight 0.10) we observe a favourable situation in Medzilaborce district, where the index values benefit significantly from the good availability of social services. This positive development is mainly due to the relatively high number of places in social service facilities available to the population, which improves the quality of life of the elderly and vulnerable groups. These factors, together with the relatively low population density and less pressure on local health and social institutions, allow for more efficient and individualised care. In Slovakia, the Health Index shows regional variations, with an east-west gradient. Although the lowest values of the Health Index were recorded mainly in the districts of southern Slovakia, the spatial pattern of the east-west gradient remains an important geographical phenomenon.

The WSA assessment method with equal weights, spatially identifies the districts of Slovakia that achieved the best Health Index values, which included the districts of Senec, Bratislava I, Bratislava V, Bratislava V, and Košice I. In the southern part of Slovakia there are districts Revúca, Rimavská Sobota, and Rožňava, where we recorded the lowest values of the Health Index (Figure 3).

Discussion

According to ROSENKÖTTER, N. *et al.* (2015), health inequalities have not been a major pol-

icy priority in the context of the development of a sustainable health information infrastructure in Europe. However, a significant shift has been taking place in recent years. The debate on the importance of health information infrastructure and the steps to further develop it has intensified considerably. This development is probably related to the increasing demands for health information, which serves as a basis for the formulation of country-specific recommendations. Monitoring WHO and European Union policy is therefore crucial, as both institutions place emphasis on the development of quality information. Experts involved in health data monitoring and reporting in Europe stress the need for a sustainable health information infrastructure and an appropriate legal framework. This phenomenon requires systematic monitoring and analysis, especially in terms of morbidity and health inequalities.

For this reason, it is also important to examine health inequalities at the regional level, which allows for a more precise identification of spatial disparities and their causes. In this paper, the territorial level of districts of Slovakia (LAU1) was therefore deliberately chosen. The spatial differentiation of health status and its determinants at this level provides a more detailed view compared to the national or regional NUTS2 level. Such analyses are not only crucial from the perspective of international statistics and projects, but play an important part in effective measures to reduce inequalities.

A variety of methods have been used to assess health inequalities, including the development of indices (composite indicators) at international and national level, as reported by FREITAS, A. *et al.* (2018), FERNANDEZ-CREHUET, J.M. (2019), and PEARSON-STUTTARD, J. *et al.* (2019). One of the significant factors was the presence of COVID-19. The pandemic further deepened existing health inequalities, highlighting disparities in access to healthcare and overall population health (BAMBRA, C. *et al.* 2020; KERSCHBAUMER, L. *et al.* 2024). In Slovakia, the topic of health inequalities comes to the fore only sporadically.

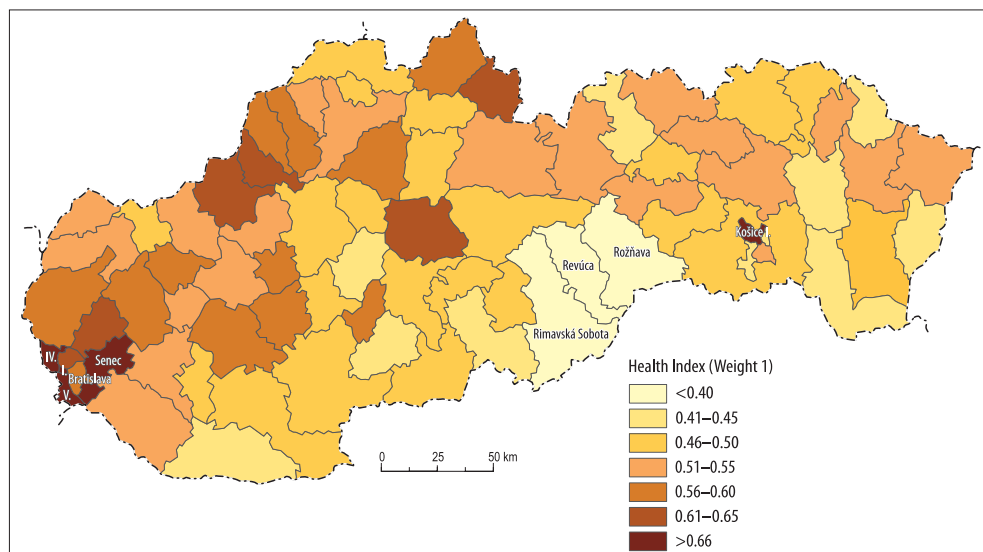


Fig. 3. Spatial differentiation based on the calculation of the Health Index values using different weightings – WSA method (2021–2022). The higher Health Index values are indicated by the darker colours of the district.
Source: Authors' own research and processing.

cally and mostly remains in the background of expert analyses and statistical surveys. Most discussions on the health situation in the country focus on selected indicators such as life expectancy, incidence of civilisation diseases or access to health care.

What is missing, however, is a broader societal discussion that highlights how health inequalities are linked to socio-economic factors, education, employment or living environment. While statistics and analytical outputs provide valuable information, they often do not reveal the complex causes and consequences of health inequalities. For example, health disparities between different regions of Slovakia are not only reflected in figures on hospital admissions or mortality rates, but are deeply rooted in the availability of quality housing, healthy lifestyles and healthcare infrastructure. However, these links are only minimally discussed publicly (SOPÓCI, J. and HRABOVSKÁ, A. 2015).

A systematic comparison of the findings of research on various aspects of health in-

equalities carried out in Western and Central European countries has made it possible to confirm these conclusions and to identify some basic trends in this area. For example, research findings in post-socialist countries have also confirmed the existence of a significant relationship between socio-economic status and health. The increasing economic and social differentiation in post-socialist countries has been accompanied by growing health inequalities between different social classes. These states also have higher levels of health inequalities than Western European states (DŽAMBAZOVIČ, R. and GERBERY, D. 2014). Meanwhile, the changes undergone by the Central and Eastern European states have had the most negative consequences regarding health inequalities on populations with lower socio-economic status. In the Slovak Republic, for example, Roma in particular have been affected (GINTER, E. *et al.* 2001; ROSICOVA, K. *et al.* 2011).

In the context of the selected Health Index indicators, a considerable number of expert

studies and papers have been produced in Slovakia. Regarding the mortality indicator, this issue has been addressed, for example, by MÉSZÁROS, J. (2008), and ŠPROCHA, B. *et al.* (2015). From the demographic point of view, health inequalities have been analysed by KÁČEROVÁ, M. *et al.* (2014), while the environmental aspect has been elaborated in detail in RAPANT, S. *et al.* (2010, 2013). A comprehensive analysis of the health status of the population in Slovakia was provided by VILINOVÁ, K. (2012). Together, these studies offer a comprehensive view of the factors influencing the health situation in the country. SOPÓCI, J. *et al.* (2015) argue that in the long and short term we observe deepening socio-economic disparities between regions and their position within the Slovak Republic is changing based on their economic and social development. The most significant consequence of this development is the concentration of social and economic problems in certain regions. The most developed region in Slovakia is the Bratislava Region, but even this region is not a homogeneous territorial unit. Here, too, there is a visible differentiation between Bratislava and other districts of the Bratislava Region. It cannot be denied that within the Slovak Republic, the Bratislava Region has a specific position in terms of material and socio-economic conditions, demographic characteristics and also in terms of health care.

The Slovak Republic, as one of the V4 countries, is very often characterised and compared with countries in this area in terms of aspects of health inequalities. Poland, for example, has recently stepped up health promotion in an effort to increase healthy life expectancy and reduce health inequalities. As in other countries, Poland has a high prevalence of health problems determined primarily by lifestyle-related factors. KARASIEWICZ, M. *et al.* (2021) in their study point to the need to intensify health promotion in rural, remote and disadvantaged populations. From their findings, they model the conclusion that despite the efforts of policy makers, there is still a high risk of unmet health needs in deprived areas. According to SOWA-

KOFKA, A. (2018), the health care system in Poland faces various challenges in ensuring equal access to services. The level of public spending on healthcare is one of the lowest in the European Union. Insufficient funding affects the quality of health services offered, increasing waiting times, resulting in an increase in inequalities. RÓJ, J. and JANKOWIAK, M. (2021) report that based on the distribution of socio-economic determinants of health, they identified inequalities among geographically defined populations. They show that in Poland, due to their geographic location, the population does not have the same opportunity to reach their full health potential. The results of their research confirmed that voivodeships are considerably heterogeneous in terms of the distribution of socio-economic determinants of health. KOBZA, J. and GEREMEK, M. (2015) report that the reduction in mortality from cardiovascular diseases, as well as changes in diet quality or the impact of economic conditions on health outcomes, also played a significant role in the longer survival years in the health of the Polish population.

According to HÜBELOVÁ, D. *et al.* (2023), spatial health inequalities persist in the Czech Republic, influenced by economic, social, demographic and environmental factors, as well as local access to health care. This is despite the fact that the Czech Republic is a relatively demographically, socially, economically and ethnically homogeneous country with a low proportion of socially excluded individuals or those living below the poverty line. However, regional or micro-regional health inequalities have persisted for a long time. The study shows that both the inner and outer peripheries exhibit poor health outcomes, challenging the assumption that urban areas are better off. The causes of inequalities in the rural periphery stem primarily from demographic and institutional factors and an inadequate labour market. As far as reducing the intensity of health inequalities in the Czech Republic is concerned, the study shows that the success rate is not great. It cites a combination of

poverty and other vulnerability indicators such as age (children, elderly), disability or minority origin as a cause that exacerbates these inequalities.

HÜBELOVÁ, D. *et al.* (2021c) point to a very favourable situation in the Czech districts of Prague-East and Prague-West, thanks in particular to a high proportion of university graduates, low unemployment, low ageing index, low infant mortality, low abortion rate as well as affordable housing subsidies. It can be stated that such a favourable situation of the districts in question is due to the immediate proximity of the district of Prague – capital city. On the contrary, the unfavourable situation in the districts of Chomutov, Teplice and Most (all districts belong to the Ústí nad Labem Region located in the north-west of the Czech Republic), compared to the districts of Prague-West and Prague-East, is characterised by differences such as high housing subsidies, high unemployment rate, low proportion of university graduates, negative migration balance or high infant mortality and abortion rates. On the basis of such results, it was possible to specify regional disparities in demographic and socio-economic indicators that cause health inequalities, either negatively or positively.

As far as the Czech health system is concerned, the Ministry of Health plays both a regulatory and a strategic role. Both the Czech Republic and Slovakia have a public health insurance system that is largely regulated by the government. Health insurance is compulsory and access to healthcare is practically universal. VRABCOVÁ, J. *et al.* (2017) argue that factors influencing years of healthy life in the Czech Republic include improvements in living conditions, public health interventions and advances in medical care. These improvements have contributed to an increase in the number of healthy life years, which is an important indicator of potential demand for both health and long-term care services, especially for the elderly.

UZZOLI, A. *et al.* (2020) explain that the general health status of the Hungarian pop-

ulation is worse than justified by the level of economic development. The deterioration in health status that had been ongoing since the mid-1960s turned into an epidemiological crisis in the early 1990s and affected the entire adult population. Since the second half of the 1990s, Hungary has faced significant improvements in many health outcomes, but the country still lags behind many more developed countries. Most of the main health indicators are worse than the OECD average, indicating that Hungary belongs to the middle tier of countries in the world in terms of the overall health of its population.

The poorer health outcomes are related to significant regional disparities in the country. Relatively, the greatest spatial inequalities are observed especially between the western and eastern parts of Hungary. The disparity between the west and the east of Hungary is also confirmed by the geographical distribution of health services, where we can observe significant differences, especially in specialised care. The disparity in public funding of outpatient capacity means that waiting times for diagnosis are prolonged, as doctors can only examine a certain number of patients for a selected paid time. In practice, this means that residents who have sufficient finances often use private services to reduce waiting times for examinations or to ensure access to better quality services (ALBERT, F. 2018).

Overall inequality can also be seen in life expectancy in Hungary, especially between the highest and lowest income groups. The latter could be reduced by as much as half, by reducing avoidable causes of death to the levels seen in Hungary's wealthiest settlements. The evidence on the role of avoidable deaths suggests that there is considerable scope for policy makers to increase the life expectancy of individuals in poorer areas as well as to reduce existing inequalities. Specifically, these include incentives to improve diets and reduce smoking, reduce solid fuel heating to improve air quality, provide better access to health care, and help poorer people receive standard health check-ups (BÍRÓ, A. *et al.* 2021).

Conclusions

According to HÜBELOVÁ, D. *et al.* (2021a) since 2009, the European Union has made reducing health inequalities a priority among its activities, with the support of the Commission's Communication Solidarity in Health in the form of the Communication 'Reducing Health Inequalities in the European Union'. Our analysis provides new information in several ways. In one place, we provide a comprehensive assessment of population health indicators using combined data from different databases. We work with data at a detailed spatial (district) resolution, allowing targeted action to reduce health inequalities at the local level. This assessment approach has not yet been applied in Slovakia. It is important to continue research on this issue. Research could focus on the districts that perform worst in terms of the Health Index and on possible explanatory factors at the individual level.

Using the weighted sum method, we have obtained aggregate Health Index values. We approached this index in two ways. In the first case, each of the given eight domains had equal importance with a weight of 1 (WSA method without weights). In the second case, each of the eight domains had a specific weight (WSA method with weights). On the basis of calculations, graphical and cartographic processing, we found that in both cases the districts with higher, more favourable values of the Health Index are mainly located in the western part of Slovakia (Bratislava I, Bratislava IV and Senec). On the contrary, districts with lower, more unfavourable values are mostly located in the southern and eastern part of the country (Revúca, Rimavská Sobota, Rožňava).

The Health Index is a comprehensive indicator that reflects the health status of a population based on a number of factors. In Slovakia, the index varies according to geographical location, with a strong east-west gradient. Western Slovakia, especially the Bratislava and Trnava regions, is characterised by a better health status of the population. Eastern Slovakia, especially the Prešov

and Košice regions, joined by the Banská Bystrica Region, shows worse results. The differences between these regions are conditioned by several factors. Western Slovakia has better access to healthcare, which means a higher concentration of hospitals, specialised medical facilities and doctors. The economic situation in these regions is more favourable, which allows for a higher standard of living, better nutrition, healthier lifestyles and a better level of prevention. In addition, there is a higher level of education, which contributes to a better awareness of healthy lifestyles and disease prevention.

In contrast, eastern and southern Slovakia face a number of challenges that negatively affect the health status of the population. The availability of healthcare is worse in these regions, with fewer hospitals and specialised doctors. Lower economic levels, higher unemployment rates and lower average incomes make access to healthcare more difficult and affect lifestyles. In addition to these factors, migration also plays an important role. Young and educated people often leave eastern and southern Slovakia for the west in search of better conditions, thus, deepening regional disparities. Infrastructure is also an important aspect, affecting access to healthcare and overall living standards in individual regions.

The health situation in Slovakia is not uniform and the differences between the regions are marked. In order to mitigate them, it is necessary to improve access to healthcare in the regions of eastern and southern Slovakia, invest in prevention and increase economic opportunities for the population. Closing these gaps is key to improving the overall health status of Slovaks and improving the quality of life across the country. The COVID-19 pandemic has exposed and exacerbated existing health inequalities and socio-economic conditions in Slovakia as well. Although the virus affected all segments of society, its impact was not evenly distributed. Vulnerable groups such as the elderly, economically weaker families, marginalised communities and the disabled were

the most affected. The pandemic has also exposed problems in the Slovak health sector, such as undersized hospitals, shortages of medical staff and ineffective health care management. Measures such as lockdowns and restrictions on healthcare for other diseases have caused the deterioration of the health status of many patients.

It is important to note that local governments have an important role to play in promoting health and addressing health inequalities. Municipalities, cities and counties have competence in a number of areas related to the determinants of health (e.g., housing, social care, environment, spatial planning, etc.). Through their decisions, they can largely influence the factors that affect the health of the population. One of the key roles of local governments is to be able to bring together a wide range of actors at the local level to create the conditions for interdisciplinary cooperation that would lead to the development and later implementation of policies, programmes and activities to promote health. Within Slovakia, the Government of the Slovak Republic has approved the National Health Promotion Programme for 2021–2030. At this level, there are projects such as Healthy Communities, whose main activity is the implementation of community health promotion. Having access to a wide range of data and information on key health indicators is essential for successful interventions to tackle health inequalities. This is where our paper could find its future application, as it contains a wealth of data and information that could be implemented in the design of programmes or activities to promote health in the districts of Slovakia.

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