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Towards health prosperity

MEASUREMENT OF ASPECTS OF HEALTH STATUS IN POLAND COMPARED TO SELECTED EUROPEAN COUNTRIES

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Introduction

In the popular understanding, prosperity is usually associated with economic characteristics - income, wealth or the availability of goods and services. In science, prosperity has broader connotations, going far beyond what we are able to measure by GDP or wages. Social prosperity consists of the level of economic development, as well as the education of children and adults, the availability of transport infrastructure, the cleanliness of the air, land and water or, most importantly, the state of health of the people. And it is this last dimension of prosperity, in all its aspects, that is the subject of this study.

In the first part of the text, we describe the concepts of health prosperity together with the factors that shape it and the importance that this dimension has for a country's socio-economic development. In the second part, we present a composite health prosperity index developed specifically for this study. It consists of three sub-indices synthesising measures of citizens' health status, health system efficiency and technological advancement. We calculated the index for seven European Union countries - Poland, Bulgaria, the Czech Republic, Denmark, the Netherlands, Germany and Sweden.

Concept of prosperity and importance of its health dimension

The definition of prosperity and how to measure it has been the subject of scientific debate among economists, sociologists, psychologists and even doctors and politicians for years. Yet, no single universally valid definition has been created. On the economic level, the measurement of prosperity usually boils down to the use of so-called value measures, usually developed within the framework of the system of national accounts. The most commonly used measure is gross domestic product (GDP), which shows the value of goods and services produced within a country during the relevant period. An alternative sometimes used is the national income measure, which examines the wages of the factors of production, i.e. workers and business owners, who are citizens of a given country.

Value measures have a number of advantages, among them the speed of calculation and the ease of comparison over time and between geographical areas. However, they do little to measure the actual quality of life of citizens or even the typical level of income or wealth. This is because these measures do not take into account the social inequalities present in a given area nor the non-financial measures of prosperity. Moreover, these measures also do not differentiate between available goods and services by their quality or importance for prosperity. As sociologists have argued, the production and sale of tobacco products are of the same importance from a national income perspective as the provision of rehabilitation services of the same value, and is far more important than fresh air, access to a forest or the opportunity to swim in a clean lake. These natural goods can even have a negative impact on GDP, as they reduce the ability to use available resources for productive purposes. This is why researchers have observed that there is no positive correlation between the level of economic development and the sense of happiness in a society. Sometimes, the opposite is even true, with the happiest societies residing in countries with relatively low levels of development - in the OECD study *How's Life?* the people of Colombia rated their wellbeing the highest in 2020.

As a result, within prosperity economics research, there have been a number of attempts to create other metrics that take into account elements such as environmental impact, education levels, happiness levels, the degree to which societies are democratised or health status levels. One of these is the HPI (*Happy Planet Index*) developed by the *New Economics Foundation*, which takes into account subjective satisfaction with life, its length and its impact on the environment. The HPI ranges from 0 to 100 and is determined more by the level of health and subjective feelings of happiness than by material status. Another commonly used measure of prosperity is the HDI (*Human Development Index*), which considers not only the economic aspect of prosperity, but also its educational and health aspects. These three dimensions are assessed on the basis of variables such as life expectancy, average number of years of education and per capita national income calculated at purchasing parity.

Still, other aspects of prosperity are taken into account by the people preparing the LCI (*Living Conditions Index*). It takes into account the housing conditions of households, their diet, mobility, cultural and sporting activities, as well as the state of the environment and access to healthcare. In recent years, a number of indicators have been created that consider environmental aspects, including the impact of economic activity on the environment. These include the GDDP (*Green Gross Domestic Product*) index and the ISEW (*Index of Sustainable Economic Welfare*). The above cursory review of available measures shows that prosperity depends on a

number of measurable and non-measurable factors, the most important of which are economic, educational, environmental and health aspects, which are key from the perspective of this study.

According to the World Health Organisation (WHO), health is defined as a state of complete physical, mental and social well-being. This means that the WHO extends the understanding of health beyond the absence of disease or disability, with a strong emphasis on the ability to lead a productive social and economic life. This is consistent with the measures of prosperity cited above, which tend to associate the health aspect with life expectancy at birth, life expectancy in good health or simply a subjective sense of happiness, which depends most strongly on a person's mental and physical well-being.

This definition is consistent with our perception of the concept of health prosperity, i.e. the full physical and mental well-being of a society. In our view, such prosperity depends not only on the current health status of citizens, which can be measured in terms of incidence of disease, mortality rates or life expectancy, but also on the availability of effective and universal health care, which enables continuous prevention and provides prompt and effective medical interventions that reduce the duration of illness, prolongs life and improves its quality. The assessment of the latter element, beyond simple population-level measurements of life expectancy, has been included in the health sciences for years, as reflected in the widely used parameter, QALY (*Quality Adjusted Life Years*). From this perspective, the overarching goal of efforts consisting of prevention, modern pharmacotherapy and restorative medicine in the broadest sense should be to extend life in full health. According to the Institute for Health Metrics and Evaluation (IHME) at the University of Washington, a leading centre for analysing global mortality and morbidity rates, the right to live a long life in full health should be available to all people, regardless of latitude.

Furthermore, as the experience of the COVID-19 pandemic has shown, health prosperity depends not only on the current availability of health care, especially in its pharmacological dimension, but also on its flexibility in crisis situations, such as a sudden increase in the number of illnesses or the emergence of new diseases. Flexibility and the ability to respond quickly to unexpected challenges depends on the development of medical technology and the availability of companies in the local economy that are able to provide additional knowledge, produce a new drug or retrofit existing facilities with the equipment necessary for hospital and ambulatory treatment. From the perspective of the experience of the pandemic, the role of the pharmaceutical industry in responding to new challenges deserves special mention. During the COVID-19 pandemic, thanks to the mobilisation of the scientific community together with the innovative pharmaceutical industry, it was possible to develop vaccines for COVID-19 in an unprecedentedly short time. So, an innovative pharmaceutical industry, combined with other elements (e.g. increasing the number of doctors trained in selected specialities, expanding continuing education among healthcare professionals and providing access to modern medical equipment), can ensure the long-term health prosperity of society - fostering a life of health and medical security even in pandemics.

Such perceived health prosperity is crucial for a country's stable and inclusive socio-economic development. Indeed, in modern economies, labour productivity depends not only on the technology used or the availability of physical capital, but also on the workers themselves - their motivation, health and creativity. The psycho-physical condition of workers, on the other hand, is, to a large extent, a derivative of their health well-being. As a result, on a macroeconomic scale, spending to improve health well-being can be viewed as typical investments - the expansion of a factory's machinery or the renovation of a store's retail space. And, like fixed asset expenditures, investments in health can be viewed in terms of the expected rate of return or capacity expansion. This is because combating disease and reducing the risk of

disability translates into lower direct costs associated with treating specific diseases and lower indirect costs associated with increased sickness absence, disability, inability to perform well and early retirement.

Furthermore, improving health prosperity is also conducive to building economic prosperity in the long term, according to research. More days at work, lower private medical expenditure and overall better wellbeing translate into an increased propensity to save and make investments with a long return horizon. Importantly, health prosperity and economic prosperity work in a positive feedback loop. The richer the society, the more resources citizens have for medical, preventive, dietary or sports services, and the higher the spending on them, the higher the flexibility and efficiency of healthcare, which in turn improves health and improves productivity, raising incomes and savings in the economy. The state plays a significant role in this process, which, through high investment in public and private health care, including funding for prevention programmes or access to innovative therapies, can increase health prosperity and build the resilience of the entire system to the burdens of pandemic outbreaks or an ageing population.

Health prosperity index

Analysed aspects of health prosperity

An optimal measure of health prosperity should comprehensively describe the three aspects affecting citizens' mental and physical well-being - citizens' health status, health care efficiency and access to health technologies - and be easily quantifiable, interpretable and comparable across time and space. It is important to realise that the complexity, heterogeneity and multidimensionality of the health care system and the health status of citizens itself makes it virtually impossible to construct a measure that meets all these conditions at the same time. Indeed, some of the available measures of health prosperity are specific to a single country and, for purely technical reasons, cannot be used to benchmark health prosperity among countries (e.g. the number of operations contracted by the state). On the other hand, the comparability of other measures is disrupted by institutional factors - regulations, laws and definitions that mean that different phenomena may be understood under the same concept in each country, which has an impact on the value of the statistics (e.g. number of years of healthy life). For this reason, universal measures that are simple to interpret and developed according to the same methodology should be considered for the creation of a health prosperity index, which, for obvious reasons, means that the resulting index does not take into account all the complexity of health prosperity in a country.

With these provisos in mind, we used nine measures extracted from publicly available statistical databases (mainly Eurostat and WHO) to calculate the health index, which ensure temporal and geographical comparability of the published variables. We transformed these measures into three standardised sub-indices that make up the final composite health prosperity index. We have described the detailed data collection and transformation methods in the methodological annex.

The population health sub-index is designed to measure the physical wellbeing of citizens at different stages of life, including the risk of death from one of the most prevalent diseases of civilisation. It consists of three measures: healthy life expectancy at birth, infant mortality per thousand live births, and the cumulative probability of dying between the ages of 30 and 70 from cardiovascular disease, diabetes, cancer or chronic respiratory disease.

The health system efficiency sub-index reflects the ability to meet the medical needs of citizens and the subjective assessment of whether these needs are being met. The efficiency of the health system depends primarily on two factors – the availability of medical staff and the availability of hospitals and equipment – so we consider the number of doctors and the number of hospital beds per 1,000 inhabitants to measure the efficiency of the health system. The third measure included is the percentage of people stating that they did not receive the medical care they needed because it was too expensive, the location of the service was too far away or the waiting time for the service itself was too long.

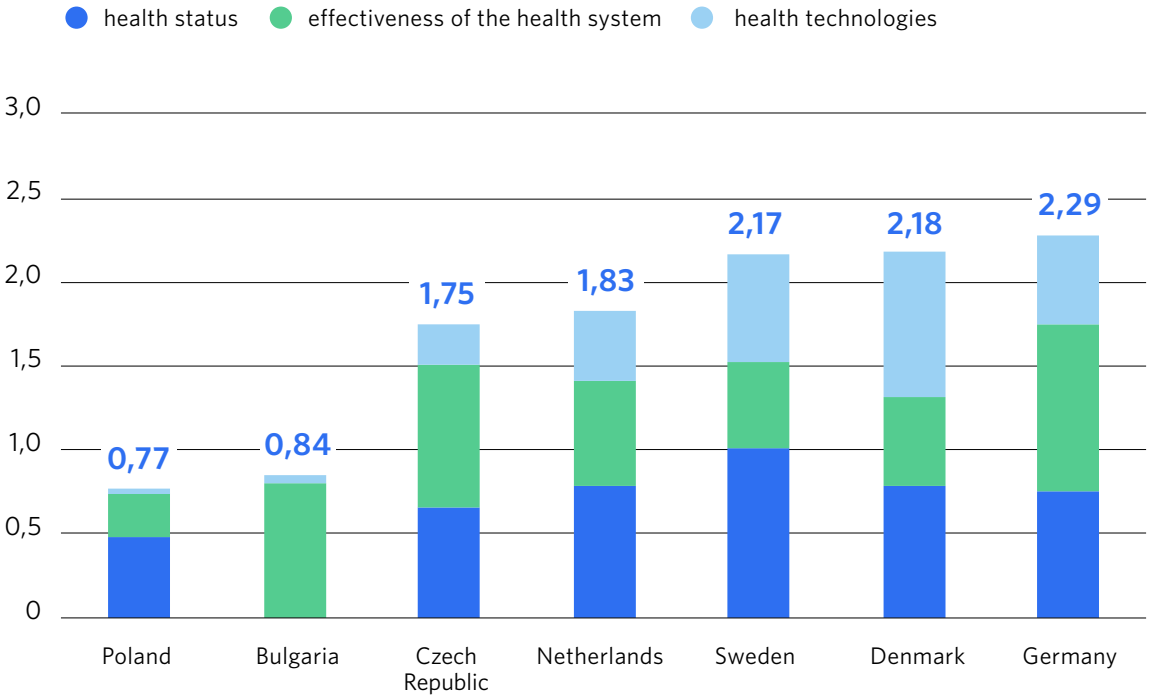
The health technology sub-index shows the availability of modern therapies, i.e. those in line with current medical knowledge (EBM, Evidence-Based Medicine). This access depends primarily on the legal and administrative environment, which allows patients to benefit from the advantages of innovative pharmacotherapy in the shortest possible time. Quick access to modern and effective therapies is also fostered by the development of healthcare companies and the efficiency of the system ensuring the protection of the intellectual property rights of companies. Indeed, all of these elements are essential to guarantee health wellbeing in crisis situations - an outbreak of a new disease or a sudden increase in demand for pharmacological

products. As the COVID-19 experience shows, countries with a developed pharmaceutical industry had an advantage in the race to provide vaccines to their citizens over countries that are recipients of medical technologies and patents. With this in mind, the sub-index in question consists of the following measures: the average number of days between a medicine being authorised in the European Union and being added to the list of reimbursable medicines in a given country; public spending on R&D in the health sector; and the number of biomedical engineers per 10,000 residents.

Health prosperity in Poland compared to selected European countries

In order to assess health prosperity in Poland using such an indicator, it is necessary to find appropriate points of reference. For comparative studies, the best benchmarks are other countries belonging to the same cultural and economic region, but with different levels of wealth and - by definition - different healthcare systems. For this reason, in order to assess health prosperity in Poland, we chose two countries from the Central and Eastern European region (the Czech Republic and Bulgaria), as well as four countries from the old European Union, representing different models of health security (Germany with the highest health care expenditure[1]; Denmark, which is characterised by a "lean" and centralised hospital sector after reforms; Sweden with the healthiest population and the Netherlands with strong pre-hospital care and competing insurers). We performed the calculations based on an average value from 2017-2020. The use of average values was intended to reduce the impact of one-off disruptions in the data, especially during pandemic periods, and to avoid problems due to missing data.

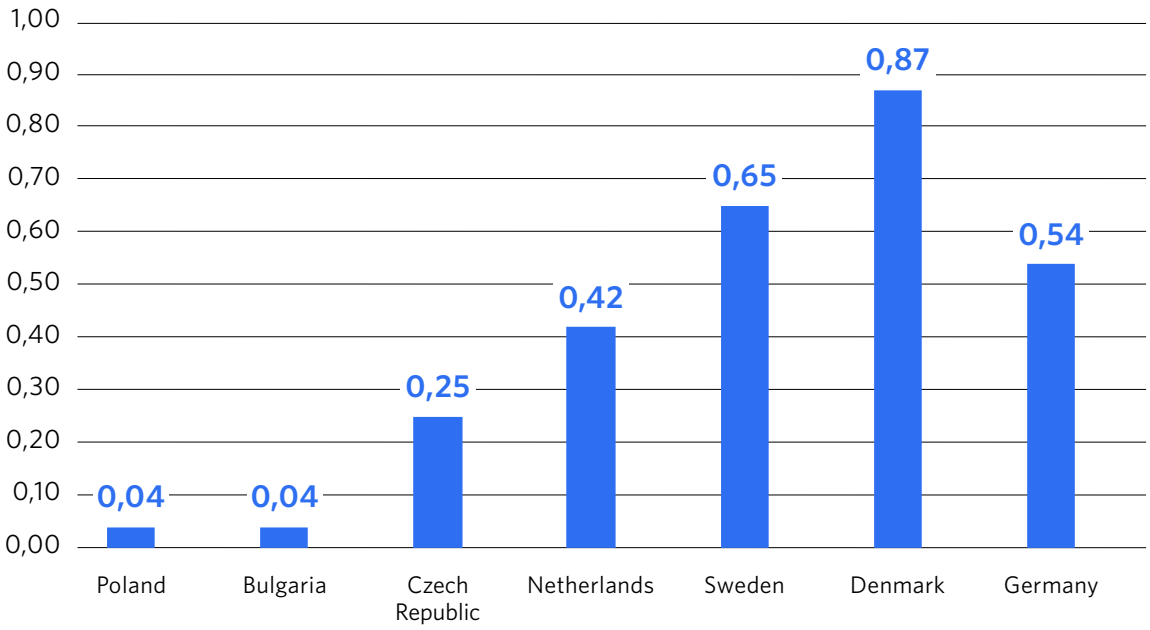
CHART 1. HEALTH PROSPERITY INDICATOR



1. According to the latest report by the OECD and the European Commission, Health at a Glance: Europe 2022, health expenditure per capita in 2020 was EUR 4,831 in Germany, compared to EUR 4,302 in the Netherlands, EUR 4,008 in Sweden and EUR 3,964 in Denmark. By comparison, in the countries of the Central and Eastern European region, they were much lower than the EU average (EUR 3,159 per capita) and amounted to EUR 1,478 in Bulgaria and EUR 1,591 in Poland.

With a health prosperity index of 0.77 points.(out of 3 points possible), Poland came last among the selected countries. It ranked just behind Bulgaria (0.84 points) and far behind neighbouring Czech Republic (1.75 points). Germany, on the other hand, performed best (2.28 points), ahead of Denmark (2.18 points) and Sweden (2.17 points). In the middle of the pack was the Netherlands with a score of 1.83 points.

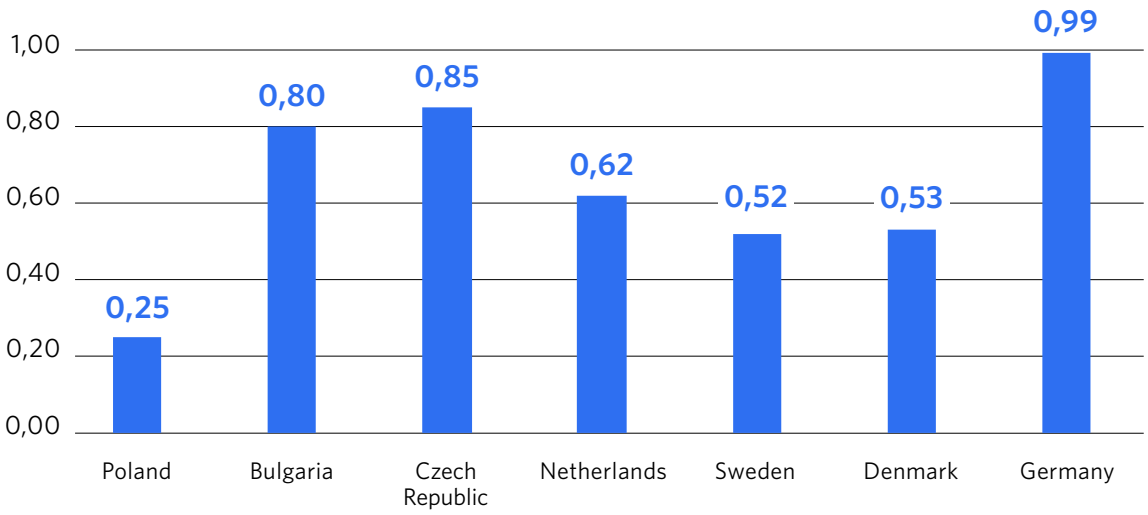
CHART 2. HEALTH TECHNOLOGIES



Poland's poor performance was mainly due to the very low value of the health technology sub-index, in which Poland scored only 0.04 points out of a possible 1 point. This was mainly due to the longest waiting time for a product to be included in the list of reimbursed medicines among all countries surveyed. Compared to citizens of other European countries, the Polish patient is forced to wait much longer for access to reimbursed therapies with documented efficacy, often prolonging life. In Poland, it is 844 days, i.e. more than 2 years and 3 months from the moment the medicine is authorised for use in the EU. By comparison, in Germany, the best performer on the list, there is only a 133-day wait for enrolment on the reimbursement list, and the average in the European Union is slightly less than one and a half years (511 days).

Poland also fares very poorly in terms of the number of biomedical engineers employed in the healthcare sector - there are only five per million inhabitants. Bulgarians and Czechs also have such a small number of specialists. In Sweden, there are 23 times as many. This is, among other things, the result of low public spending on research and development in the health sector. In Poland, it accounts for just 0.02 per cent of GDP, or PLN 0.3 billion per year. Low public spending, combined with poor private sector funding opportunities for health industry development and a slow drug approval and reimbursement process, make the pharmaceutical industry in Poland inflexible and unable to deliver health prosperity in times of crisis.

CHART 3. EFFICIENCY OF THE HEALTH CARE SYSTEM



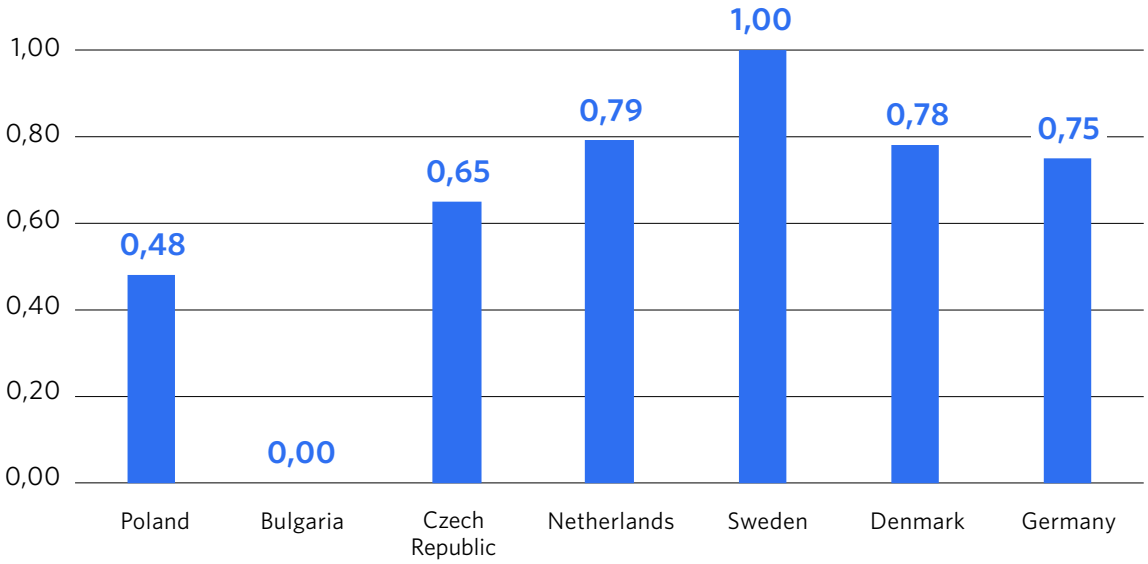
Poland scored equally low in the sub-index measuring the effectiveness of the health system - 0.25 points, or a quarter of all possible points. Sweden, second from last, scored more than twice as many points. The inefficiency of Polish healthcare is primarily the result of a very low number of doctors - there are just 239 of them per 100,000 inhabitants. In most other countries, the figure exceeds 400 doctors, and only in the Netherlands is it slightly lower at 372 doctors. This is also a problem for all the medical staff available in the Polish health care system. The number of nurses and paramedics is also insufficient, and the ageing population will further exacerbate this crisis as a disproportionate number of medical staff are of retirement or pre-retirement age.

The only input in the health care system in terms of which Poland performs relatively well is the number of available beds per 100,000 residents. The number of beds in Polish hospitals is 645, slightly fewer than in the neighbouring Czech Republic (661), but much higher than in Sweden (214), Denmark (260) or the Netherlands (319). Only Germany (797 beds per 100,000 residents) and Bulgaria (759) have significantly higher outlays in kind. Although it is important to realise that a high number of beds per capita is not necessarily an indicator of well-organised healthcare. On the contrary, it may indicate an inversion of the so-called pyramid of medical services, i.e. an overemphasis on costly hospital care at the expense of cheaper, faster and less staff-intensive outpatient care, which in many health cases is sufficient to provide access to modern therapies and thus to maintain the health prosperity of citizens.

These findings confirm the opinions of Poles, with 3.4 per cent indicating that they could not receive the necessary medical care. In comparison, in Germany and the Netherlands, this percentage is marginal at 0.2 per cent. Interestingly, the percentage of Poles declaring a lack of access to medical services halved after the outbreak of the pandemic - to 1.9 per cent in 2020 from 4.2 per cent in 2019. This is likely to be the result of the launch of tele-consulations, which made it easier to contact a specialist doctor. In light of the document "Report on the health of Poles. Diagnosis after the COVID-19 pandemic: Impacts, challenges and recommendations", in 2020, i.e. in the first year of the pandemic, more than one-third of primary care advice (56.8 million such medical services) was provided remotely. However, the high increase in mortality from diseases probably unrelated to the effects of COVID-19 indicates that the expansion of access to healthcare has not necessarily meant an improvement in its effectiveness. Indeed, tele-consulations proved inadequate in many cases.

Given Poland's woefully poor performance in the above two dimensions of health prosperity, the country's relatively high score in the health status sub-index is a positive surprise. Indeed, Poland scored 0.48 points, nearly half of all possible points, which placed it behind the Czech Republic (0.65 points) and far ahead of the sickest Bulgarian society (0 points).

CHART 4. STATE OF HEALTH



Poland performed best in terms of infant mortality with a rate of 3.8 deaths per thousand live births, a result only slightly worse than in the Netherlands (3.7), Denmark (3.5) and Germany (3.4). It reflects the very good quality of prenatal, gynaecological, obstetric, neonatal and paediatric care compared to other specialties. For other measures of health status, Poland ranked slightly below the Czech Republic and well above Bulgaria, while lagging far behind the old EU countries. Swedish society is the healthiest. Swedes ranked first in all the measures we considered, giving them the maximum possible score in this sub-index. In comparison, Sweden's healthy life expectancy at birth is 71.9 years, while in Poland it is more than three years shorter at 68.7. Similarly, the probability of dying between the ages of 30 and 70 from one of the diseases listed in the index (cardiovascular disease, cancer, chronic respiratory disease) in Sweden is only 8.38 per cent. In Poland, it is more than twice as high at almost 17 per cent.

These results show that Poland has much room for improvement in the health prosperity of its citizens in practically all its dimensions. It is not possible to achieve a significant improvement in the health status of Poles without increasing the number of available medical staff, as well as without investing in the entire health care system, especially in ambulatory care and preventive measures. Institutional changes are also necessary, including expediting the refund process for new medicines, especially those with proven efficacy in diseases that pose the greatest challenge to public health. Meanwhile, the development of new medicines by domestic pharmaceutical companies will not be possible without the introduction of instruments to encourage research and development activities in the broader biomedical sector, financed by both private capital and state funding. The establishment of the Agency for Medical Research (ABM) in 2019 is an example of institutional support that should be considered a step in the right direction. However, it is still too early to assess to what extent ABM's support of the biomedical sector will translate into an increase in patients' access to innovative and effective therapies, leading to an improvement in their health prosperity.

Conclusion

The differences in the levels of the health prosperity index between countries constitute an important rationale for changes in health policy in Poland. It is particularly important to focus action on those elements where differences with other European countries are the greatest, i.e. to support the development of health technologies and improve the efficiency of the entire health care system. This will make it possible to narrow the gap between Poland and our closer and further neighbours.

In our opinion, in order to improve the efficiency of healthcare, it will be necessary above all to increase the number of doctors working in the healthcare system. In this context, the significant increase in the number of medical students who are expected to populate the Polish health service in a few years is to be commended. However, due to the time required to educate a specialist doctor, we will only be able to see the effects of these measures in at least 10-12 years, as long as doctors educated in Poland do not decide to work abroad. It is therefore also necessary to have an active migration policy to improve the efficiency of healthcare, including attracting specialist doctors, paramedics and nurses trained in other countries.

Improvements in the technological area, on the other hand, primarily require an increase in R&D spending in the biomedical sector and easier access for patients to innovative therapies. This can be achieved by speeding up the refunding of medicines with proven efficacy and by ensuring wide access to them for citizens. The latter can be achieved by ensuring continuing education of physicians in modern medical therapies and by redirecting a greater flow of funds to finance innovative therapies, particularly breakthrough therapies from the patient's point of view.

Annex. Method of calculating the health prosperity index

Data sources

The variables used in the study are averages for 2017-2020 from all data available for this period for Poland, Bulgaria, the Czech Republic, Denmark, Germany, Sweden and the Netherlands. Most of the data comes from the Eurostat database, which ensures maximum comparability of the obtained indicators between the studied countries. Other data comes from the WHO and EFPIA (European Federation of Pharmaceutical Industries and Associations) databases.

The table below provides details of the variables used along with the data sources.

FULL NAME OF THE VARIABLE	DATA SOURCE	VARIABLE TYPE
VARIABLES CONSTITUTING THE POPULATION HEALTH STATUS SUB-INDEX		
Healthy life expectancy at birth (HALE)	WHO	Stimulant
Infant mortality per 1,000 live births	Eurostat	Destimulant
Likelihood of death between the ages of 30-70 from cardiovascular disease, cancer, diabetes, or chronic respiratory disease	WHO	Destimulant
VARIABLES COMPRISING THE HEALTH SYSTEM EFFICIENCY SUB-INDEX		
Number of doctors per 100,000 people	Eurostat	Stimulant
Number of hospital beds per 100,000 people	Eurostat	Stimulant
Percentage of people reporting that their health protection needs were not met for reasons beyond their control, i.e. unavailability of services for financial (too expensive), geographical (too far away) or time (too long to access) reasons	Eurostat	Destimulant
VARIABLES COMPRISING THE HEALTH TECHNOLOGY SUB-INDEX		
Average number of days from marketing authorisation to the inclusion of a medicine on the list of reimbursed medicines	EFPIA	Stimulant
Government budget expenditure on R&D in the health sector as a proportion of GDP	Eurostat	Stimulant
Biomedical engineers per 10,000 people	WHO	Stimulant

Data standardisation method

Each variable was rescaled so that all measures and all countries analysed could be compared to each other concurrently. In the case of a stimulant, i.e. a variable whose higher value depicts a higher level of health prosperity, the country with the highest value received 1 point and the country with the lowest value received 0 points. The remaining countries received between 0 and 1 point. The value was equal to the proportion between the value of the variable in the country and the highest value of the variable in the sample. For example, for healthy life expectancy, Sweden with the highest value of the variable (71.9 years) received 1 point, Bulgaria with the lowest value of the variable (66.3 years) received 0 points, and Poland with variable value of 68.7 years received 0.43 points.

An analogous method was used for destimulants, i.e. variables for which higher values indicate lower health prosperity for the country. For these, the country with the highest value received 0 points and the country with the lowest value of the variable received 1 point. The remaining countries received between 0 and 1 point. The value was equal to the proportion between the value of the variable in a country and the highest value of the variable in the sample. For example, for infant mortality, Sweden with the lowest value of the variable (2.23 per 1000 live births) received 1 point, Bulgaria with the highest value of the variable (5.77 per 1000 live births) received 0 points, and Poland with a variable value of 3.80 infant deaths per 1000 live births received 0.56 points.

Method of calculating the index

The health prosperity index is the sum of the values taken by three sub-indices: the health status of the population, the efficiency of the health system and health technology. Each of these sub-indices is, in turn, the arithmetic mean of the standardised values of the three variables representing health prosperity in a given dimension (comparable table above). As a result, the health prosperity index can take values from 0 to 3 points, where 0 points means that a country had the worst performance in all areas analysed and 3 points means that a country had the best performance in all areas analysed. The higher the value of the indicator, the higher the health prosperity of a country's population.