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HEALTHFLATION: HEALTHCARE SECTORS HOSTAGE TO MACROECONOMIC INSTABILITY AND COST OF LIVING CRISIS

ХЕЛСФЛЯЦІЯ: СФЕРА ОХОРОНИ ЗДОРОВ'Я В ЗАРУЧНИКАХ У МАКРОЕКОНОМІЧНОЇ НЕСТАБІЛЬНОСТІ ТА КРИЗИ ВАРТОСТІ ЖИТТЯ

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Abstract. *The hypothesis of the article is to recognize the fact that the impact of inflation on health deserves academic attention. Based on the statement that inflation negatively affects health, and the more negative this impact is, the more vulnerable certain groups of people are in terms of socio-economic status, we set ourselves the goal of defining the category of "healthflation", which will allow us to actualize an important component of price instability. We have established that the term "healthflation" is an explanation of price fluctuations that occurred: (1) as a result of restrictions on the international movement of goods and services, international movement of labor as a result of the implementation of border closure and self-isolation policies; (2) in the field of medical care, in the medical services market, in the medical equipment market and in the pharmaceutical market (including the vaccine market); (3) due to the cost of medical services, the need for which arose as a result of the deterioration of health, which is associated with the cost of living crisis, which resulted in a reduction in economic activity and economic growth rates under the influence of the pandemic. It is noted that health inflation, which manifests itself in a reduction in the purchasing power of economic agents, can occur: as a reaction to pandemics (where, as a result of the introduction of restrictions on the movement of factors of production, the supply of goods decreases, which provokes an increase in prices); as a reaction to a decrease in labor productivity due to a*

decrease in economic activity and a deterioration in health as a component of human capital; as a reaction to an attempt to implement large-scale projects aimed at improving the health of the population and/or projects to increase national security in the field of providing drugs of strategic importance, the center of production of which may be a country from the "unfriendly" list, which will allow it to use drugs as a weapon; as a reaction to a change in the structure of population expenditures due to a deterioration in health (reduction in consumption of certain types of services, increase in consumption of goods) and the use of preventive measures; as a reaction to the redistribution of budget expenditures due to a decrease in revenues (taxes, attracted investments), which forcibly reduces the volume of medical care provided, increasing household spending on private medical services. According to the author's approach, health inflation or healthcare inflation can also be defined as the difference between the growth of healthcare spending per capita and the growth in life expectancy. It was found that the average annual health inflation was 4.3% per year in 2000-2022 and peaked at 9.2% in 2020 at the beginning of the COVID-19 pandemic. Health inflation was lowest in low-income countries and relatively higher in fast-growing and upper-middle-income countries, showing a nonlinear relationship with the level of development, which can be explained by the fact that in difficult times people focus on essential health services that are crucial for their security. On the other hand, in conditions of rapid economic growth, people can afford to buy more services that are less urgent but provide a better quality of life and are willing to pay more for them, which can affect the prices of health services. The dependence on economic growth has persisted during the pandemic, but another factor has also become significant – inflation, which is negatively correlated with health inflation.

Key words: *international macroeconomics, world economy, inflation, deflation, healthflation, covid pandemic, liquidity trap, liquidity, demand, supply, investment, savings, household, price stability, health economics, health systems, health policy, health services market, health services, debt, labor resources, workforce, human capital, productivity, cost of living crisis*

Анотація. *Гіпотеза статті полягає у визнанні того факту, що вплив інфляції на здоров'я заслуговує академічної спільноти. Виходячи із твердження, що інфляція негативно впливає на здоров'я, і тим негативнішим є цей вплив, чим більш уразливими з точки зору соціально-економічного становища є окремі групи людей, ми ставимо собі за мету визначити категорію «healthflation», що дозволить актуалізувати важливу складову цінової нестабільності. Нами було встановлено, що термін «healthflation» є поясненням цінових флуктуацій, які сталися: (1) внаслідок обмеження міжнародного руху товарів та послуг, міжнародного руху робочої сили у результаті впровадження політики закриття кордонів та самоізоляції; (2) у сфері медичної допомоги, на ринку медичних послуг, на ринку медичного обладнання та на фармацевтичному ринку (у тому числі на ринку вакцин); (3) внаслідок витрат на медичні послуги, потреба у яких виникла у результаті погіршення стану здоров'я, що пов'язане із кризою вартості життя, що результувала скорочення економічної активності та темпів зростання економіки під впливом пандемії. Визначено, що хелсфляція, що виявляється у скороченні купівельної спроможності економічних агентів, може виникати: як реакція на пандемії (де внаслідок введення обмежень на рух факторів виробництва зменшується пропозиція товарів, що провокує зростання цін); як реакція на зменшення продуктивності праці внаслідок скорочення економічної активності та погіршення здоров'я як складової людського капіталу; як реакція на спробу в обмежені часові межі реалізувати масштабні проєкти, спрямовані на оздоровлення населення та/або проєкти щодо підвищення національної безпеки у сфері забезпечення препаратами стратегічного значення, центром виробництва яких може виявитися країна зі списку «недружніх», що дозволить їй використовувати ліки як зброю; як реакція на зміну структури витрат населення внаслідок погіршення стану здоров'я (скорочення споживання окремих видів послуг, зростання споживання товарів) та використання превентивних засобів; як реакція на перерозподіл бюджетних видатків внаслідок зменшення доходів (податків, залучених інвестицій), що вимушено зменшує обсяги медичної допомоги, що надається, збільшуючи витрати домогосподарств на приватні медичні послуги. За авторським підходом, хелсфляцію або*

інфляцію охорони здоров'я також можна визначити як різницю між зростанням витрат на охорону здоров'я на душу населення та зростанням тривалості життя. Встановлено, що середньорічна хелсфляція становила 4,3% на рік у 2000-2022 роках і досягла піку в 9,2% у 2020 році на початку пандемії COVID-19. Хелсфляція була найнижчою в країнах з низьким рівнем доходу та відносно вищою в країнах з швидким зростанням та рівнем доходу вище середнього, демонструючи нелінійну залежність від рівня розвитку, що може бути пояснене тим, що у важкі часи люди зосереджуються на найважливіших медичних послугах, які мають вирішальне значення для їхньої безпеки. З іншого боку, за умов швидкого економічного зростання люди можуть дозволити собі купувати більше послуг, які є менш терміновими, але забезпечують кращу якість життя, і готові платити за них більше грошей, що може вплинути на ціни на медичні послуги. Залежність від економічного зростання зберігалася і в період пандемії, але інший фактор також став значним – інфляція з негативною кореляцією з інфляцією охорони здоров'я.

Ключові слова: *міжнародна макроекономіка, світова економіка, інфляція, дефляція, healthflation, пандемія ковід, пастка ліквідності, ліквідність, попит, пропозиція, інвестиції, заощадження, домогосподарство, цінова стабільність, економіка охорони здоров'я, системи охорони здоров'я, політика охорони здоров'я, ринок медичних послуг, послуги охорони здоров'я, борг, трудові ресурси, робоча сила, людський капітал, продуктивність, криза вартості життя.*

Introduction. IMF researchers analyzed the impact of epidemics, wars and natural disasters on inflation over the past 100 years and found that epidemics are always followed by a jump in inflation – albeit a short-term one (*Harding, M., Lindé, J., & Trabandt, M., 2023)*. The Covid pandemic was no exception. One of the main problems of the global economy caused by the pandemic was inflation. Its immediate causes were record liquidity injections, ultra-low and negative rates of leading central banks, and rising supply costs. The increase in government support packages for the provision of medical care was combined with the encouragement of green public and private investments, as well as fair climate investments of households, which were supposed to become an additional trigger for economic growth. The "commodity supercycle", when a wide range of raw materials are traded at prices above long-term trends, the lion's share of which are critical for the green and digital transition, has already added a fly in the ointment of price stability. Climate change also directly affects the health of the population and the ability to generate *income (Reznikova, N., & Panchenko, V., 2023)*. The allocation of funds for measures to combat climate change and to mitigate the effects of climate change may reduce the space for health spending, which may have unpredictable consequences for inflation, even so much that they may undermine the efforts of monetary policy to maintain price stability. Forced savings due to the physical impossibility of purchasing goods and services due to anti-pandemic restrictions, reduced incomes, and the desire to save were compensated by a large-scale expansion of the money supply and monetization of budget deficits, which removed the risks of deflation. Governments increased their debts in the fight against the pandemic, and for them, currency devaluation could ease the burden of debt by devaluing it, i.e., inflation *(Reznikova, N., & Ivashchenko, O., 2016)*. Inflation in this case becomes an alternative to raising taxes or cutting spending immediately after the crisis. The pandemic has seriously changed the structure of consumption, shifting the emphasis from the services sector to goods. The demand for technological and digital services has grown significantly. At the same time, a number of authors prove that pandemics can lead to both accelerated inflation and deflation. As a result of a pandemic, the so-called "inflation saw" may occur: a slowdown in inflation and then an acceleration. Initially, an outbreak of infection becomes a deflationary factor, but stimulus programs mitigate the effect of deflationary forces and can subsequently lead to excessive inflation. In a situation where the level of economic uncertainty is high and the central bank interest rate is low, there is a very narrow corridor

between two traps – a deflation trap and an inflation trap. The path to deflation looks like a liquidity trap: the crisis provokes a "flight to safety" – people increase precautionary savings, reducing consumption, which puts downward pressure on prices; expectations of further decline in demand force people to save even more, and low rates leave no room to support demand by easing monetary policy. In an inflation trap, people increase consumption, which accelerates the rate of price growth; people seek to invest in safe assets, such as foreign currency, which weakens the national currency and also fuels inflation. There are now factors that have both inflationary (growing government debt obligations and deferred demand) and deflationary effects (economic uncertainty and weak economic activity) *(Reznikova, N., Ptashchenko, O., Chugayev, O., & Ivashchenko, O., 2022)*; *Reznikova N., Ivashchenko O., Hrynchak N., & Dvornyk I., 2022*; *(Reznikova, N., Bulatova, O., Yatsenko, O., Ivashchenko, O., 2022); (Reznikova, N., Panchenko, V., Ivashchenko, O., 2021)*.

The purpose of the article. Taking for granted that inflation has a negative impact on health, and the more negative this impact is, the more vulnerable certain groups of people are from the point of view of their socio-economic status, we set ourselves the goal of defining the category of "healthflation", which will allow us to actualize an important component of price instability. Reducing the impact of inflation on health is worthy of academic attention.

Literature review. The macroeconomics of pandemics has become an object of study at the intersection of interdisciplinary research *(Eichenbaum, M. S., Rebelo, S., & Trabandt, M., 2020*; *Bloom, D. E., Kuhn, M., & Prettner, K., 2020; (World Bank. (2020a)*; *(Borelli, L, Góes, G. S.(2021)*; *(Almås, I., Bold, T., von Carnap, T., Ghisolfi, S., & Sandefur, J., 2023); (Yfantopoulos, J., Zhong, F., & Khanam, R., 2024)*. The studies emphasize the fact that large-scale government aid packages were aimed at eliminating the consequences of the pandemic, which led to inflationary processes *(Loveday, M., & Beck, L., 2020; Martin, A., Chazan, G., Mallet, V., Johnson, M., & Dombey, D., 2020)*. At the same time, restrictions introduced during the pandemic have increased production costs, which has contributed to the increase in supply-side inflation. Consumers are increasingly characterizing price increases as an act of greed on the part of entrepreneurs, and they call this phenomenon greedflation *(Krompas, I., 2023*; *Çakır, M., Liaukonyte, J., & Richards, T.J., 2025)*. The authors argue that firms with market power (firms that can increase and maintain the price of their products or services above the level that would exist in a perfectly competitive market) are, in effect, using global inflation as an excuse to raise prices to a greater extent than would actually be appropriate *(Vidyakina, M., & Reznikova, N., 2013)*. Research into corporate financial data provides quantitative evidence that companies have used the pandemic to raise prices above cost to their highest levels in nearly 70 years *(Jeurissen, P, Hasan, R, Den Besten, M, & Cylus. J., 2024)*.

Main results of the research. The famous American economist, Nobel laureate Kenneth Arrow noted that among the numerous factors that shape the health of the population, medical care is only one of them, but in fact other factors are very important *(Hammer, J., H., Haas-Wilson, D., & Sage, W.M., 2001)*. In poor countries, income, other goods and services, housing, basic sanitary facilities, clothing, access to healthy food are much more important – all this is important for the formation of health. Thus, the economy as a whole forms the health of the population, and not just the health care system. And here, in different countries, depending on their income, and whether the countries are poor or rich, different factors that form health come to the fore. Analysis of studies proves that in different countries, depending on the level of economic development, certain factors form the health of the population *(Eichenbaum, M.S., Rebelo, S., & Trabandt, M., 2021*, *(Chetty, R., Friedman, J., Hendren, N-, Stepner, M., & the Opportunity Insights Team, 2020*, *(Guerrieri, V., Lorenzoni, G., Straub L., & Werning, I., 2020)*, *(Movsisyan, A., Wendel, F., Bethel, A., Coenen, M., Krajewska, J., Littlecott, H., Stöckl, H., & Voss, S., 2024)*.

Being an integral property of the labor force, health, along with other qualitative characteristics of the labor force (education, qualifications), has a significant impact on the pace of socio-economic development of society. The health status of the population determines the well-being of families, enterprises of various profiles, the economic well-being of the region, and also determines the quantitative and qualitative characteristics of the labor force and the social, economic

and labor activity of the population, which in turn have a direct impact on the level of the most important macroeconomic indicators (GDP, national income, etc.). The second aspect of the relationship between the health of the population and the economy of regions and the country as a whole is the volume of expenditure on health care. In all developed and developing countries, there is an increase in expenditure due to funding from various sources (from the state budget, through health insurance or through direct payment by the patient) *(Reznikova, N., & Rubtsova, M., 2018)*.

Depending on the level at which economic relations are considered within the healthcare system or outside it, they can be divided into macroeconomic relations (relations are formed within the framework of the national economy as a whole and, above all, in those sectors that are directly related to healthcare), micro relations (the activities of each individual medical and preventive institution), as well as economic ties within the healthcare system as a sector of the economy consisting of a number of sub-sectors, industries and specializations related to the solution of one functional task – the protection and strengthening of public health. *(Reznikova N. V., Ivashchenko O. A., & Voitovych, O., 2018)*.

Direct economic losses due to morbidity include the costs of providing medical care and social insurance benefits for temporary disability and disability pensions. Indirect economic losses are losses due to decreased labor productivity due to morbidity, the volume of under-produced products at an industrial enterprise, and the integral reduction in national income at the level of the entire national economy due to temporary or permanent disability or death of people of working age. It is also necessary to take into account the fact that indirect economic losses are many times greater than direct economic damage due to morbidity. According to scientists, direct economic losses account for about 10% of the total economic damage due to diseases, while indirect losses account for almost 90%. *(Jakovljevic, M., & Ogura, S., 2016)*. Organization of various health promotion activities aimed at reducing the incidence rate (vaccination of the population, for example) or vaccination, injury prevention, preventive examinations for the early detection of diseases significantly reduce the economic damage due to diseases. Reduction in incidence after active health promotion activities and reduction in economic damage due to reduction in incidence determine the economic effect of health care. Several mechanisms determine the relationship between income and health: a decrease in income of at least one member of the household limits the purchase of health-supporting goods for all family members. Energy inflation leads to the need to redistribute income in favor of heating due to a decrease in the quality of nutrition, which, in turn, leads to deterioration in health. A decrease in income can make rent unaffordable, leads to a deterioration in living conditions, this leads to a high level of stress and affects the incidence rate. Consequently, a deterioration in living conditions (a crisis in the quality of life), energy and fuel poverty can lead to a forced increase in spending on health services.

It should be noted that the concepts of "health care inflation" and "global medical inflation" have already been used in scientific studies. Researchers describe the direct and indirect consequences of inflation for both the health care industry and households *(Black, N., Harris, A., Jayawardana, D., & Johnston, D., 2023).* "Inflation-adjusted health care spending" is a key economic indicator that reflects the real purchasing power of funds spent on health care. This indicator is calculated by adjusting nominal health care spending for overall economy-wide inflation, which allows us to assess the true dynamics of health care financing relative to overall price growth in the economy. Inflation-adjusted health care spending directly affects the budget deficit through several mechanisms *(Reznikova, N., & Rubtsova, M., 2019)*. First, a decrease in real health care spending can temporarily relieve pressure on the government budget, since health care accounts for a significant share of government spending. Research shows that health care spending as a share of US GDP has declined from a peak of over 20% in mid-2020 to 18% in May 2022. However, this relationship is twofold. On the one hand, a slowdown in health care spending may help reduce the budget deficit in the short term. On the other hand, such a slowdown may result from deferred medical care or underfunding of the health care system, which in the long term may lead to increased spending due to the need to treat advanced diseases. It is especially important to note the role of federal health care support programs during the COVID-19 pandemic. The study points to one-time federal spending, such as the Medicare Accelerated and Advance Payment

programs, that has distorted normal spending patterns and its impact on the budget deficit *(ALTARUM, 2022)*. Central to the concept of "inflation-adjusted health care spending" is its relationship to overall inflation. The study *(ALTARUM, 2022)* shows that the decline in real health care spending in 2021–22 was driven largely by the fact that health care price increases lagged overall inflation. The data show that overall inflation increased sharply beginning in the second quarter of 2021, initially driven by rising prices of goods (cars, computer chips) and then by services. At the same time, health care price increases remained at or below their long-term average. This divergence is explained by the unique nature of health care pricing, where prices are often set in advance through contract negotiations and government programs. This dynamic creates a temporary "window of opportunity" for the economy when health care costs do not add to inflationary pressures. However, the study warns that this period may be short-lived, as new provider contracts set to take effect in 2022 are already showing signs of accelerating health care price increases. The concept of "health care inflation" should not be confused with the concept of "Covid inflation" *(Cavallo, A., 2020*; *Giannone, D., & Primiceri, G., 2024)*. "Covid inflation" is a specific type of inflation that emerged during the COVID-19 pandemic and is characterized by a significant discrepancy between official consumer price indices and the real change in the cost of living for the population. Covid inflation arose as a result of a fundamental change in the structure of consumer spending during the pandemic. Due to quarantine measures and social distancing, people significantly reduced spending on transport, tourism, public catering, sports and increased spending on food, home entertainment and essential goods. The main problem is that official statistical indices are based on a fixed consumer basket, which is revised only once a year. During the pandemic, consumer preferences changed dramatically and quickly, which led to a decrease in the informativeness of official inflation estimates. The pandemic created an unprecedented situation: millions of goods and services in dozens of countries became unavailable to consumers due to the closure of retail outlets and service enterprises. This led to the "problem of disappearing goods and services", when a significant part of the official consumer basket simply disappeared from real consumption.

The analysis of the studies allows us to make a number of generalizations *(Ruhm, CJ., 2005*); *Black, N., Harris, A., Jayawardana, D., & Johnston, D., 2024*; *Bentley, R, Daniel, L, Li, Y, Baker, E, & Li, A., 2023)*. High inflation affects health through multi-level, interconnected mechanisms. High inflation is the main trigger of the entire chain of effects, and low wage growth is an aggravating factor, creating a scissors between price and income growth. These economic conditions are reinforced by government policies such as higher interest rates, which, although aimed at combating inflation, create additional pressure on the cost of living in the short term. Researchers distinguish three main channels of influence: (1) Material hardship affects: food insecurity (inability to ensure access to nutritious and safe food) *(Bhattacharya, J., Currie, J., & Haider, S., 2004)*; energy poverty or inability to ensure adequate heating / cooling of housing; lead to the phenomenon of deferred health care (postponement of medical services due to their cost); threaten housing instability (*Bentley, R, Daniel, L, Li, Y, Baker, E, & Li, A., 2023)*; (2) Psychosocial effects increase financial stress (constant worry about the ability to meet basic needs), relationship strain (conflicts within family and social networks due to financial pressure), and cognitive load (reduced decision-making and concentration) *(Butterworth, P., Rodgers, B., Windsor, TD.)*; (3) Behavioural effects include: increased working hours (an attempt to compensate for the lack of income); lifestyle changes (adjustments to eating habits, leisure time, physical activity). Mutually reinforcing mechanisms arise due to the cyclical nature of the problem: psychosocial effects lead to decreased productivity and earnings, which further aggravate all three types of effects, creating a vicious circle. All three channels of influence converge in health consequences, including deteriorating mental health, physical health problems, and changes in health-related behavior.

In order to demonstrate the alternative nature of the approach we propose in relation to existing studies, we propose to refer to the study of A. Charlesworth *(Charlesworth, A., 2014)*, in which the author defines the concept of health care inflation through several key characteristics and dimensions. "Health care inflation" is understood by the author as an increase in health care costs, which systematically exceeds the rate of general inflation in the economy. This phenomenon is

characterized by the fact that the costs of medical services increase faster than the general price level in the country. The author provides specific figures to illustrate this phenomenon in the UK: over the past 20 years, general inflation in the UK has averaged just over 2% per year; health care costs have grown at a rate of 3.6% per year; since the foundation of the National Health Service (NHS) 65 years ago, health care costs have increased by approximately 4% annually. The author identifies two main approaches to measuring health care inflation: (1) comparison with general economic inflation (it uses the GDP deflator as an indicator of inflation in the entire economy, and this approach is important from the point of view of taxpayers, since it reflects the real contribution to the increase in NHS resources); (2) NHS Wage and Price Index (measures changes in the cost of NHS staff; takes into account the cost of goods and services purchased by the NHS (drugs, medical equipment, utilities, cleaning contracts).

Essentially, A. Charlesworth *(Charlesworth, A., 2014)* separates health care inflation into two main components:

(1). Staff costs – this accounts for around half of all health care spending. Despite the special mechanism for setting NHS wages through independent pay review boards, over the long term, NHS pay trends track wage trends for similarly skilled workers in the wider economy fairly closely.

(2). Goods and services – this component of health care inflation tends to rise at a rate similar to the overall rate of inflation in the economy (1.8% per annum, compared with an average annual rise in the GDP deflator of 2.2% per annum).

A. Charlesworth *(Charlesworth, A., 2014)* highlights an important paradox: NHS input costs are not becoming relatively more expensive than input costs elsewhere in the economy. This means that health care inflation is not explained by overly generous wage increases or disproportionate increases in the prices of health care goods and services. A. Charlesworth *(Charlesworth, A., 2014)* identifies two main factors that explain higher inflation in healthcare:

1. Structural changes in the labour market: wages of highly skilled workers grew faster than those of low-skilled workers, and the healthcare sector has a higher proportion of highly skilled workers than the economy average.

2. Changes in the skill composition of the NHS staff: the healthcare system uses an increasing proportion of highly skilled personnel to provide medical care. For example, in 1997, 10% of nurses had higher education, and by 2010 this figure had risen to 40%.

Thus, health care inflation in the A. Charlesworth's understanding is a complex phenomenon that reflects not only the growth of prices for medical services, but also structural changes in the healthcare economy associated with the improvement of personnel qualifications and the specifics of technological development in the medical field *(Charlesworth, A., 2014)*.

Therefore, the term “healthflation” proposed by us serves as an explanation for the “price vicissitudes” that occurred: (1) as a result of restrictions on the international movement of goods and services, the international movement of labor as a result of border closure and self-isolation policies; (2) in the field of medical care, in the medical services market, in the medical equipment market and in the pharmaceutical market (including the vaccine market); (3) as a result of expenses on medical services, the need for which arose as a result of the deterioration of health due to the cost of living crisis as a consequence of the reduction in economic activity and economic growth rates under the influence of the pandemic).

According to our approach, healthflation, manifested in a reduction in the purchasing power of economic agents, can occur:

1) as a response to pandemics (where, as a result of the introduction of restrictions on the movement of production factors, the supply of goods decreases, provoking an increase in prices);

2) as a response to a decrease in labor productivity as a result of a reduction in economic activity and deterioration in health as a component of human capital; 3) as a reaction to an attempt to implement large-scale projects aimed at improving the health of the population and/or projects to improve national security in the area of providing drugs of strategic importance in a limited time frame, the center of production of which may be a country from the list of “unfriendly” countries, which will allow it to use drugs as a weapon;

4) as a reaction to a change in the structure of population expenditure due to deteriorating health (reduced consumption of certain types of services, increased consumption of goods) and the use of preventive measures (masks, disinfectants, etc.);

5) as a reaction to the redistribution of budget expenditures due to a decrease in revenues (taxes, attracted investments), which is forced to reduce the volume of medical care provided, increasing household spending on private medical services.

Methodology. On the other hand, healthflation may be conceptually defined as growth of prices for health-related services. But what should be unit price? It is possible to consider a wide range of medical services, but their composition varies in various countries, they largely differ in their efficiency and prices may be distorted depending on the type of financing medical services (by the government budget, insurance companies, charity organizations, patients themselves including sometimes informal payments). Nevertheless, it is possible to consider a universal objective equivalent of human health improvement, such as increase in life expectancy, which is largely the ultimate goal of medical procedures (besides quality of life aspect). Therefore operational definition of healthflation (HF) in further analysis is the difference:

$$HF=HE-LE,$$

where HE is increase in Current health expenditure per capita, PPP (current international $) in % and LE is increase in Life expectancy at birth, total (years) in %. A positive value of HF means that growth of healthcare expenditure is not that efficient as it could be, possibly due to growth in prices for medical services, diminishing efficiency of additional medical treatment or other effects.

Several factors of healthflation are analyzed with correlation analysis:

- Life expectancy at birth, total (years);
- Current health expenditure per capita, PPP (current international $);
- Out-of-pocket expenditure (% of current health expenditure);
- External health expenditure (% of current health expenditure);
- Unemployment, total (% of total labor force) from World Bank (*World Bank, 2025b)*;
- Inflation, consumer prices (annual %);
- GNI per capita growth (annual %);
- Gini index;
- GDP per capita, PPP (constant 2021 international $) from World Bank *(World Bank, 2025c).*

HF is calculated for a long-term period (2022 relatively 2000), pandemic period (2021 relatively 2019) and short-term period (for each individual year). Correlations are calculated based on panel data (up to 6000 cases: country-years) and cross-sectional data (up to 236 cases: countries or country groups). As for factors, their average values within the analyzed periods are calculated for cross-sectional correlations as well as starting values in base years for HE and LE. Correlation analysis is followed by regression analysis. In the final models only factors with significant b-coefficients are left.

Results. Tables 1 and 2 demonstrate healthflation trends. On average it was 4.3% worldwide. There was a peak in 2020-2021 (under decrease in life expectancy by 0.9 and 1.3% in these years due to the COVID-19 pandemic) and local peaks in 2001 and 2006. And the lowest healthflation was in 2010, 2017 and 2022. But the trend patterns were largely different in East Asia & Pacific (correlation only 0.29 with global fluctuations), Brazil (0.25), China (0.1), Japan (-0.08), Nigeria (0.23), Poland (0.29).

Table 1. Healthflation in country groups.

Country groups / years	World	High income	Upper middle income	Lower middle income	Low income	European Union	East Asia & Pacific	Latin America & Caribbean	Middle East & North Africa	Sub-Saharan Africa
2001	6.3	7.3	5.5	9.8	2.6	6.4	5.6	4.6	9.0	4.9
2002	5.7	7.6	5.5	1.0	8.7	7.1	6.0	1.0	-0.2	-2.2
2003	5.5	6.4	7.3	7.1	9.3	4.6	8.3	2.2	-0.1	22.1
2004	5.1	5.0	7.6	6.1	6.0	4.1	6.5	5.5	2.9	3.7
2005	5.2	5.5	8.2	6.9	5.8	4.5	8.2	6.3	1.2	4.2
2006	6.5	6.7	8.8	6.3	11.3	7.6	7.3	8.7	4.7	6.5
2007	5.2	5.1	8.8	4.6	6.2	5.0	6.8	8.9	5.6	3.9
2008	5.1	5.1	8.8	4.0	1.4	7.6	9.0	5.0	1.5	2.3
2009	5.5	4.7	11.6	5.2	9.0	5.1	11.0	5.1	20.7	5.3
2010	1.9	2.6	4.1	1.3	-2.3	2.6	6.1	2.4	-2.2	-2.0
2011	3.9	3.8	7.8	3.1	-1.0	3.3	12.8	4.0	2.7	2.5
2012	3.5	3.2	6.9	8.2	-2.7	2.0	8.6	2.0	3.6	-1.8
2013	3.5	3.2	6.1	10.1	7.8	3.5	6.6	5.8	0.9	4.3
2014	3.2	3.5	5.0	0.8	8.1	2.3	4.5	4.1	7.2	0.2
2015	3.1	3.5	4.1	4.7	0.6	3.1	5.0	3.5	1.8	1.9
2016	3.0	3.6	3.3	3.0	7.3	5.5	2.9	0.2	3.7	0.7
2017	2.6	3.5	5.0	-3.3	-3.4	4.7	4.5	5.9	1.3	-3.5
2018	3.5	3.9	5.8	2.6	-4.1	4.4	7.1	2.5	-2.4	-4.9
2019	4.5	5.3	6.2	6.0	2.2	8.3	8.2	-1.6	-2.8	2.4
2020	9.2	11.5	6.7	4.7	4.6	7.8	6.9	3.2	6.3	4.6
2021	7.7	6.4	10.2	16.6	7.1	10.6	9.1	13.2	3.3	8.3
2022	2.4	3.6	4.0	5.1	-0.4	4.7	7.0	1.9	-4.4	4.7
2022/2000	183	203	336	222	146	214	381	158	90	107
2021/2019	17	18	17	22	12	19	17	16	10	13

Source: calculated by the authors

The highest long-term healthflation was in upper middle income economies, East Asia & Pacific, and specifically in such countries as Armenia (1564%), Mozambique (1167%), Myanmar (1091%) and among large economies – China (764%) and Russia (556%). The lowest one was in Middle East & North Africa, Sub-Saharan Africa and low income economies, and specifically in the Gambia (-87%), Brunei Darussalam (-34%), Lebanon (-29%) and among large economies – Brazil (116%).

Table 2. Healthflation in selected countries.

Countries / years	Brazil	China	France	Germany	India	Japan	Nigeria	Poland	Russian Federation	Ukraine	United Kingdom	United States
2001	4.4	3.3	6.6	4.2	10.5	5.0	5.5	11.1	12.8	17.0	9.3	7.5
2002	4.6	13.1	7.0	5.6	2.2	3.8	-12.2	13.2	15.0	12.9	10.0	8.6
2003	-4.7	12.1	-0.4	4.4	1.5	4.5	113.9	2.0	7.5	23.0	6.5	7.5
2004	5.9	8.7	2.7	1.8	6.9	5.2	-2.3	6.8	1.2	9.2	8.8	5.3
2005	3.5	11.1	5.5	2.8	4.1	6.1	2.9	2.8	15.8	10.2	2.4	5.9
2006	8.2	8.6	7.4	5.8	3.7	4.5	-1.3	8.7	24.2	12.9	7.8	5.6
2007	6.6	8.1	4.0	4.4	5.6	5.2	-2.4	12.2	9.9	4.4	4.6	4.8
2008	3.1	17.2	4.5	5.9	3.1	4.6	2.3	17.9	24.5	-5.1	6.6	2.9
2009	3.9	21.5	5.9	6.6	5.1	4.9	5.8	8.4	9.6	1.8	3.3	2.9
2010	1.7	7.0	2.7	4.4	1.1	6.7	-10.9	5.9	-7.2	7.5	3.2	2.7
2011	2.8	13.9	3.4	5.6	2.4	18.8	4.3	4.8	-1.1	7.3	1.4	2.2
2012	-0.9	14.7	1.9	2.6	10.1	5.0	1.4	3.7	9.2	8.9	4.0	2.9
2013	6.5	9.9	5.5	5.3	16.4	4.5	6.1	6.2	9.7	11.0	5.0	1.8
2014	5.9	6.1	1.7	4.1	-0.8	0.6	3.0	2.5	2.1	-1.7	2.2	4.4
2015	-0.8	6.5	1.4	3.7	3.1	3.4	5.5	5.7	-5.1	1.2	2.7	4.8
2016	-0.4	4.6	5.2	5.9	3.5	-1.8	-2.1	7.6	-0.7	5.4	2.7	3.8
2017	4.9	7.1	2.8	5.7	-11.9	1.9	1.6	6.3	7.6	4.0	2.5	3.0
2018	3.1	10.4	2.8	5.5	4.5	2.3	-16.4	2.7	10.6	8.1	3.7	3.5
2019	3.8	11.9	9.0	7.2	7.6	3.3	-2.3	13.0	9.0	-0.8	8.2	3.4
2020	-0.8	8.8	5.9	7.9	7.9	1.4	10.2	4.7	43.9	5.4	16.7	13.0
2021	12.8	7.3	10.3	9.1	17.8	5.0	27.2	14.0	-0.7	20.5	9.7	3.6
2022	2.0	9.6	3.6	6.0	4.1	8.6	12.2	9.8	1.0		1.5	2.2

2022/2000	116	764	168	211	204	177	213	423	556	381	235	172
2021/2019	12	17	17	18	27	6	40	19	42	27	28	17

Source: calculated by the authors

But during the pandemic period the highest healthflation was in Lower middle income economies, and by countries in Guyana (80%), Liberia (71%), Uzbekistan (60%), and as for large ones – in Russia (42%) and Nigeria (40%). It was the lowest in Middle East & North Africa, Low income economies, and by countries in Lebanon (-61%), Lesotho (-49%), Surinam (-42%), in large ones in Japan (6%) and Brazil (12%).

According to cross-sectional data in 2000-2022 there were correlations of healthflation with (significant at $p<0.05$) – with possible explanations:

- Starting level of Current health expenditure per capita (-0.2) – when it below reasonable level it may be a government policy or consumer priority to increase the expenditure when circumstances permit it;
- Out-of-pocket expenditure share (0.20) – market based healthcare system may be associated with faster growth of prices for medical services;
- GNI per capita growth (0.59) – under economic crisis people focus on the most essential medical services which are crucial for safety, while under economic boom they may practice consuming also less essential medical services and more expensive medicine, which is more about ensuring better quality of life than survival;

The correlation with GDP per capita was only marginally significant at $p<0.1$ (-0.12).

During the pandemic period there were correlations of healthflation with (significant at $p<0.05$):

- Starting level of Life expectancy at birth (0.14) – higher life expectance means a larger share of senior citizens, which were more sensitive to COVID-19, which made treatment more costly and widely used;
- Unemployment (-0.13) – higher unemployment is associated with a recession (see the effect of economic growth above);
- External health expenditure (-0.21) – foreign aid for healthcare may mean improvement in technology of medical services, synergy of domestic and foreign knowledge and experience, and may be more focused on ensuring survival than quality of life or there may be an indirect effect as External health expenditure and Life expectancy are strongly correlated (-0.63);
- Inflation (-0.31) – there may be a substitution effect under high inflation, when people have to spend more on food and other essential products than on healthcare;
- Gini index (-0.21) – under high inequality a larger share of people focus only on survival healthcare than on quality of life healthcare;
- GNI per capita growth (0.36).

GNI per capita growth (EG) was the only indicator with correlations in both periods. Moreover it was the only indicator with practically significant correlation according to panel data (0.21).

In the long term period regression model is (R^2=0.34, N=183):

$$HF=136.2+62.0EG$$
$$(18.7)^{***}\ (6.3)^{***}$$

In the pandemic period regression model is (R^2=0.21, N=178) includes also inflation (Inf):

$$HF=19.0+1.53EG-0.16.0Inf$$
$$(1.08)^{***}\ (0.34)^{***}\ (0.039)^{***}$$

Conclusions. At the early stage of the pandemic and global renewal, most governments rightly focused the first wave of stimulus measures on the most important priorities: supporting the

healthcare sector and providing direct assistance to households, businesses and ordinary workers. Imported medicines became more expensive due to the falling purchasing power of currencies, due to the rise in prices of raw materials imported from abroad. This led to a shortage of a number of cheap basic medicines, since the increased costs of substances made it unprofitable for manufacturers to produce them. But later, when the crisis began to develop into a long-term economic downturn, governments tried to use the "green agenda" as a way to stimulate national development and announced an increase in the volume of financing for the green transition.

We consider health as a form of capital. Human capital is obviously linked to economic performance. At the same time, health is an important component of human capital, which means that health is linked to economic performance. Health contributes to the economy (both at the individual level and at the national level, especially in high-income countries) through increased productivity, labor supply, skills, and savings that become available for investment in physical and intellectual capital. And, accordingly, any actions that a person takes to improve their health, maintain it, we consider as investments. This confirms that health is part of the human capital of an individual and of all labor resources. That is, investments in health are investments in human capital, which means that, all other things being equal, the possibility of economic growth of the country as a whole depends on investments in health.

Healthflation may also be defined as the difference between growth in health expenditure per capita and life expectancy growth. It reflects increasing price of universal objective equivalent of human health improvement proxied by life expectancy growth. An average annual healthflation was 4.3% per year in 2000-2022 and peaked at 9.2% in 2020 at the onset of the COVID-19 pandemic.

It was the lowest in low income economies and relatively higher in fast growing and upper middle income economies showing nonlinear dependence on development level. A possible explanation is that in hard times people focus on the most essential medical services which are crucial for their safety. On the other hand, under fast economic growth people may afford to buy more services, which are less urgent but provide better quality of life, and are ready to pay more money for them. This may affect prices of the healthcare services. The dependence on economic growth remained in the pandemic period too, but another factor became also significant – inflation with a negative correlation with healthflation. Further studies may reveal more detailed channels through which the factors affect this phenomenon.

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