UDC 614.2:005.336.1(477)(100)
DOI https://doi.org/10.32782/2077-6594/2026.3/18

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Assessing the Performance of Ukraine's Health System in an International Context

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Оцінювання ефективності української системи охорони здоров'я в міжнародному контексті

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Introduction

Assessment of health system performance has become an essential component of evidence-informed health policy and strategic decision-making worldwide [1]. Systematic assessments of health system performance – regularly conducted at international and regional levels by the World Health Organization (WHO), the Organisation for Economic Co-operation and Development (OECD), and the European Union (EU) – enable a clear comparison between a country's level of macroeconomic development and its health sector performance, ultimately helping to identify sustainable models of health system governance [2; 3].

Measuring performance becomes particularly relevant during periods of institutional shifts. The transfer of Ukraine by the World Bank to the category of countries with income above the middle (upper-middle-income) actualizes the need to assess the compliance of the health system with new socio-economic challenges [4]. At the same time, there is a shortage of comprehensive, methodologically compatible assessments of the functioning of the national health system in the global and regional context in the domestic scientific discourse. Most studies are limited to monitoring individual areas of reform or assessing fragmentary medical and demographic indicators, which makes it difficult to identify systemic gaps and justify strategic development priorities [5].

The above-mentioned necessitates a holistic assessment of the functioning of the Ukrainian healthcare sector in the international context based on representative data from the last pre-war period of stable development (2021) [4].

The purpose of the study is a comprehensive comparative assessment of the performance of the Ukrainian health system in the international context to identify strengths, problematic components, and potential areas for its improvement.

Object, materials and research methods

The study was based on the WHO conceptual framework for health system performance assessment using the three-component matrix "resources – coverage – outputs/outcomes" [2]. To implement this approach and ensure high reliability of the results, a representative information base was formed, which covers official macroeconomic, financial, and medical-demographic data from international institutions for 2021. The choice of 2021 as the base year reflects the last year of relatively stable functioning and development of the Ukrainian health care system in the pre-war period, the data of which are fully represented in global databases and allow for a correct comparative assessment without distortions caused by the consequences of a full-scale invasion.

The study has a comparative design. The main sources of primary information were the World Health Organization (WHO – who.int/data), the World Health Organization's Global Health Observatory (WHO Global Health Observatory – https://www.who.int/data/gho), the World Bank databases (World Bank Open Data – https://data.worldbank.org), statistical reports of the Organization for Economic Co-operation and Development (OECD Health at a Glance 2023 – https://www.oecd.org/content/dam/oecd/en/publications/reports/2023/11/health-at-a-glance-2023_e04f8239/7a7afb35-en.pdf) and the Statistical Service of the European Union (Eurostat Data Browser – https://ec.europa.eu/eurostat/data-browser/explore/all/all_themes). Additionally, the results of the "Global Burden of Disease" project of the Institute for Health Metrics and Evaluation (IHME Global Burden of Disease Results – https://vizhub.healthdata.org/gbd-results/) were used to verify the global burden of disease and calculate integral population health indicators.

In accordance with the chosen concept, the analysis of the Ukrainian health system was carried out using three consecutive clusters of indicators. The first step was to study resource provision and financial architecture. This cluster of indicators was assessed through the prism of total health expenditure as a percentage of gross domestic product (GDP), nominal current expenditure per capita in US dollars (USD), and purchasing power parity (PPP – international USD). The share of public financing in the total expenditure structure (GGHE-D % CHE) and the level of direct out-of-pocket payments of the population (OOP % CHE) were also calculated, which, in combination

with the indicator of catastrophic household expenditure, allowed us to assess the degree of financial protection of citizens from impoverishment due to illness. The second cluster of indicators (service coverage) was analyzed using the Universal Health Coverage (UHC) index, which reflects the functional accessibility of basic health care. The third cluster of indicators – outcomes – encompassed integral indicators of population health, specifically life expectancy at birth, healthy life expectancy (HALE), maternal and infant mortality rates, and mortality rates from tuberculosis. It also included the probability of dying between ages 30 and 70 from four main groups of non-communicable diseases (cardiovascular diseases, cancer, diabetes, and chronic respiratory diseases), as well as overall Disability-Adjusted Life Years (DALYs) per 100.000 population. Particular attention was paid to avoidable mortality, a key integral indicator of health system performance developed by OECD/Eurostat [6] and widely used across their member states. To calculate the avoidable mortality rate for Ukraine, the latest available 2020 datasets from the State Statistics Service of Ukraine [7] were used, covering cause-specific deaths by age and sex, as well as population size stratified by sex and 16 age groups.

To obtain objective conclusions regarding the performance assessment of Ukraine's health system, comparative analysis and benchmarking methods were used. This allowed comparing the functional indicators of the system with leading international and regional practices, identifying system gaps and adapting development guidelines. The comparison was carried out with the average values of the European Union (EU-27), the Organization for Economic Cooperation and Development (OECD), and the average world indicators. Particular attention was paid to comparing Ukraine with different categories of countries by income level according to the World Bank classification. Given the official transfer of Ukraine from July 1, 2024, to the category of countries with an upper-middle-income category, the comparative analysis was carried out simultaneously with two groups: the historical group of countries with an income below the middle (lower-middle-income), in which Ukraine was at the time of 2021, and the new group of countries with an income above the middle. This allowed us to verify the real readiness and compliance of the national system with the standards and challenges of the new economic category.

Data processing. The analytical stage of the study was based on the application of the methods of the systems approach and structural-functional analysis to substantiate a comprehensive model of population health assessment. All financial and medical-demographic indicators, before comparison, underwent a methodological compatibility check in accordance with the WHO Guidelines for Monitoring Universal Health Coverage [7]. In order to eliminate inflationary and currency distortions when comparing per capita expenditures, purchasing power parity (PPP) coefficients were used. Statistical analysis of the obtained results was carried out using statistical software packages (MS Excel, Statistica/SPSS). The results were interpreted using a benchmarking approach, where the average indicators of the EU-27 and OECD countries were considered as reference values.

Research results

The results of the comparative analysis and methodological assessment of the Ukrainian health system based on selected, most relevant international data for three clusters of indicators are presented in the table 1. Several of the indicators taken, including avoidable mortality, should be considered preliminary, as additional verification of the original data sets is ongoing. The study also revealed deep structural imbalances between the volume of mobilized financial resources, the level of protection of citizens, and the final indicators of the health status of the population.

The analysis of macroeconomic indicators included in the first cluster (resources and financing of the health system) indicates significant disparities between the volume of total expenditures and the sources of their formation. In 2021, total healthcare spending in Ukraine amounted to 8.2% of GDP. This exceeds the indicator of countries with incomes above the average (5.7%) and approaches the average European level (EU-27 – 10.81%), which indicates a significant share of healthcare in the national economy. At the same time, spending per capita at PPP ($1382 PPP) is significantly lower than the EU level ($5469) and the OECD ($6364), although it is ahead of the average for countries in the upper-middle income group ($1082) and the world average ($1683). The main financing problem remains the high share of OOP health expenditure, which amounts to 45.3% of all expenditure. This figure is three times higher than the EU (14.7%) and OECD (12.95%) and is in line with the level of lower-middle-income countries (47.5%). The lack of public funding (the share of GGHE-D in total health expenditure is 52.1% compared to 76.4% in the EU) causes a high financial burden on patients: 17.1% of households face critical medical expenses, which significantly exceed the global average threshold (over 11%).

A review of the indicators of the second cluster (health service coverage) shows that despite limited public funding, UHC Service Coverage Index in Ukraine in 2021 was 74 points. This is higher than the global average (67 points) and the indicator of countries with income below the middle (58 points). At the same time, Ukraine lags somewhat behind the group of countries with income above the middle (77 points), as well as the EU and OECD benchmarks (80 points), which indicates the preservation of basic infrastructure and accessibility of medical care.

The assessment of the indicators of the third cluster (health outcomes) reflects a contrasting profile of the e performance of the Ukrainian system. Some indicators indicate its relative success: life expectancy at birth (71.4 years) and HALE (61.1 years) are maintained at the level of the world average values (70.9 and 61.7, respectively). Maternal mortality (26 per 100.000 live

Table 1

Key international indicators of the functioning of the Ukrainian health system in a comparative context (according to 2021 data)

Indicator	Ukraine	EU-27	OECD	World	Upper-middle-income countries	Lower-middle-income countries
Health system resources and financing						
Health expenditure, total (% of GDP) [h]	8.2	10.81	13.3	10.3	5.7	3.8
Current health expenditure per capita (US$) [h]	369.9	3759.9	4489	1257.6	582.8	105
Current health expenditure per capita, PPP (US$) [h c]	1382	5469	6364	1683	1082	273
General government health expenditure (% of current health expenditure – GGHE-D%CHE) [e]	52.1	76.4	65.4	63.1	54.4	31.0
Out-of-pocket health expenditure (% of total expenditure on health – OOP) [e]	45.3	14.7	12.95	17.0	32.0	47.5
Catastrophic expenditure * [c e]	17.1	–	–	>11	–	–
Health service coverage						
UHC Service Coverage Index [a b g]**	74	≈80	≥80	67	77	58
Health outcomes						
Life expectancy at birth (years)[a g f e]	71.4	80.1	80.3	70.9	74.3	66.2
Healthy Life Expectancy (HALE) [h]	61.1	68.6	66.8	61.7	65.5	57.9
Probability of dying between exact ages 30 and 70 years from cardiovascular disease, cancer, diabetes or chronic respiratory disease (%)[a]	24.8	12.1	11.8	17.8	17.1	22.8
Age-standardized DALY rate per 100.000 population [h]	36641	22008	25176	37090	28371	45749
Age-standardized Avoidable mortality (per 100.000) [f]***	prelimi-nary estimate (under validation) 410–435	271.6	222	–	–	–
Maternal Mortality ratio (modern estimate, per 100000 live birth) [a e]****	26	8	–	203	93	289
Mortality rate, infant (per 1000 live births) [e]	8	3	6	29	12	28
Age-standardized tuberculosis mortality rate (per 100.000 population) [e]	9.7	0.5	1.2	16.6	14	26

Sources: (a) WHO; (b) WHO GHO; (c) WHO Regional Office for Europe; (d) WHO UHC Monitoring Report; (e) World Bank Open Data; (f) OECD Health at a Glance 2023; (g) Eurostat; (h) IHME GBD Results

** Note 1. Aggregated catastrophic cost indicators for comparison groups are not available due to a critical shortage or unevenness of relevant primary data for individual countries.*

***Note 2. The reports use the latest internationally comparable data for 2019, which is the official basis for assessing the state of UHC in 2021 generalization.*

**** Note 3. For Ukraine, the latest available data for 2020 was used; for the EU-27 and OECD, data for the same period, for the World and countries with incomes above and below the average, such indicators are not available.*

***** Note 4: For the Maternal mortality ratio indicator, the aggregated value for OECD countries is not provided, since the official World Bank estimate for 2021 differs significantly from the values of adjacent years, which limits the possibility of its correct interpretation.*

births), infant mortality (8 per 1,000 live births), and tuberculosis mortality (9.7 per 100.000 population) are also significantly better than the world average benchmarks and indicators of countries with income levels lower and higher than the average.

At the same time, another part of the indicators clearly demonstrates a negative deviation compared to most groups of countries. The main factor of the gap is the extremely high **probability** of dying between exact ages 30 and 70 years from four major non-communicable diseases (cardiovascular, oncological, diabetes and chronic respiratory diseases), which in Ukraine is 24.8% – this is twice as much as the EU (12.1%) and OECD (11.8%) levels and even exceeds the indicators of countries with

lower-middle-income (22.8%). The critical state is also confirmed by other metrics: the lost Disability-Adjusted Life Years (DALYs rate) is 36.641 per 100 thousand population (almost 66% higher than the EU level – 22.008), and the avoidable mortality rate (410–435 per 100 thousand) significantly exceeds the EU (271.6) and OECD (222) indicators.

Discussion of research results

The results of the analysis of the three selected clusters – resources and financing, coverage of health services, and health outcomes – allow for a comprehensive assessment of health system performance at the stage of its transition to the group of countries with an upper-middle-income according to the World Bank classification [4]. A comparison of these data demonstrates a pronounced resource-result disproportion, i.e., a discrepancy between the resources spent and the effect achieved.

An analysis of the first and second clusters reveals that, despite limited total health expenditure per capita and a critically high share of out-of-pocket spending, the UHC index – as well as maternal, infant, and tuberculosis mortality rates – are significantly better than global averages and those of lower-middle-income countries. This phenomenon is explained by the institutional legacy of a health system rooted in the Semashko model, which emphasized strict infection control and prioritized maternal and child health, as demonstrated by studies of health system performance in other post-Soviet states [8].

At the same time, the indicators of the third cluster reveal critical systemic shortcomings in the long-term control of risk factors for noncommunicable diseases (NCDs). This is primarily reflected in the high probability of premature death from the four main NCDs, which is twice as high as the EU-27 and OECD levels. As noted in the WHO STEPS study (2019), these trends indicate an insufficient realization of the potential of primary health care and the public health system [9]. The failure to adequately respond to the epidemiological transition of the 1960s–1970s, the substitution of real prevention with bureaucratized dispensary care, and the ignoring of risk factors have historically shaped a deep gap in healthy life expectancy (HALE) between Western and Eastern Europe [10].

A direct consequence of the disparities identified in the clusters is the unsatisfactory values of avoidable mortality. This composite indicator combines the effectiveness of state policy in promoting healthy lifestyles (preventable mortality) and the clinical network's ability to provide quality care to patients (amenable mortality). The critically high level of potentially avoidable mortality in Ukraine demonstrates that the relatively high index of service coverage masks systemic inefficiency of medical interventions. International experience highlights the different nature of this indicator: if the surge in the relevant indicators in the EU and OECD countries was due to the temporary pandemic burden of COVID-19 [11; 12], then in Ukraine these losses are of a chronic nature. The example of Central Europe shows that the reduction of avoidable mortality begins only after improving the quality of screening of major NCDs and overcoming the financial barrier of high OOP spending [13].

An attempt to overcome these barriers in Ukraine was the introduction of the 'money follows the patient' principle and the launch of the Medical Guarantee Program [14]. Although this partially streamlined facility financing, the reform has not yet yielded significant improvements in overall health system performance. The relatively high share of health expenditure in GDP does not guarantee adequate financial protection for the population, and the high incidence of catastrophic health expenditure (CHE) among households partially undermines the social function of healthcare [15; 16]. These findings indicate the urgent need to shift the focus from volume-based purchasing to paying for quality and patient-centered outcomes (value-based healthcare). Furthermore, the country's economic transition to a higher income category requires enhanced clinical and economic efficiency within the health system. Priority reform vectors that can positively affect allocative efficiency in healthcare include increasing funding for primary health care and the Affordable Medicines program. This will help reduce out-of-pocket costs to the target OOP threshold appropriate for this income group (≤32.0%) [4].

This study has several important limitations. First, while using 2021 macro-level statistics ensured the methodological purity of the pre-war baseline comparison, it does not reflect the infrastructure destruction and demographic shifts caused by the full-scale invasion. Second, the baseline indicators were subject to the epidemiological pressure of the COVID-19 pandemic, which temporarily distorted the healthcare expenditure structure. Finally, a lack of primary data or methodological incompatibilities across international repositories constrained the calculation of certain aggregated indicators for the reference groups.

Prospects for further research

Future research is planned to focus on improving methodological tools for measuring avoidable mortality. Particular attention will be paid to classifying causes of death according to their sensitivity to health interventions, medical care, or a combination thereof. Calculating these indicators based on individual records in the mortality databases of the State Statistics Service will allow for a more precise identification of the main causes of death (nosologies) that influence efficiency gaps. In addition, models will be developed to evaluate effective strategies for reducing out-of-pocket (OOP) healthcare expenditures to the target level of ≤32.0%

Conclusions

A comprehensive assessment of the performance of Ukraine's health system in an international context reveals a clear structural mismatch between resource

inputs and system performance. Although total healthcare spending accounts for a significant share of GDP, insufficient public funding shifts a substantial portion of costs onto household budgets, leading to a high incidence of catastrophic health expenditure (CHE) and undermining the social protection function of the sector.

Despite budgetary constraints, access to essential healthcare services remains relatively high compared to countries in the same income group, as reflected in relatively favorable indicators for combating infectious diseases, as well as lower maternal and child mortality. Conversely, the system shows low effectiveness, relative to international benchmarks, in managing non-communicable diseases. This is evidenced by a range of integrated health metrics: an elevated probability of premature adult mortality (aged 30–70 years), reduced healthy life expectancy (HALE), a high burden of disability-adjusted life years (DALYs) lost, and elevated levels of avoidable mortality compared to EU and OECD countries.

These findings confirm persistent vulnerabilities in disease prevention and management. Following Ukraine's transition to the upper-middle-income country group, strategic reforms must focus on reorienting the system from volume-based purchasing to paying for quality in prevention and treatment, prioritizing primary health care and expanding medicines reimbursement schemes to keep direct out-of-pocket patient costs within safe thresholds.

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Purpose is the comprehensive comparative assessment of the performance of the Ukrainian health system in the international context for identifieng strengths, problematic components, and potential areas for its improvement.

Materials and Methods. A comparative study was conducted using 2021 data from the WHO, World Bank, OECD, Eurostat, and the Institute for Health Metrics and Evaluation. Ukraine's health system was compared with EU-27, OECD, world averages, and World Bank income groups. Age-standardized avoidable mortality was estimated from official Ukrainian mortality and population statistics.

Results. Ukraine spent 8.2% of GDP on health, but public financing represented only 52.1% of total health expenditure, contributing to high out-of-pocket payments (45.3%) and catastrophic household health expenditure (17.1%). Despite these financial constraints, the country maintained relatively good service coverage and favourable outcomes in maternal and child health and tuberculosis control. In contrast, outcomes for non-communicable diseases remained poor. Premature mortality from major non-communicable diseases reached 24.8%, while preliminary avoidable mortality was estimated at 410–435 per 100.000 population, substantially exceeding EU and OECD levels. These patterns reflect a resource-efficiency mismatch, where relatively good access to care is coupled with weak financial protection and poor population health outcomes.

Conclusions. Improving health system performance requires stronger financial protection, better prevention and management of non-communicable diseases, and modernization of primary health care to reduce avoidable mortality.

Key words: health system performance, benchmarking, universal health coverage, avoidable mortality, non-communicable diseases, Ukraine.

Мета – комплексне порівняльне оцінювання ефективності функціонування системи охорони здоров'я України в міжнародному контексті для визначення сильних сторін, проблемних компонентів та потенційних напрямів її удосконалення.

Матеріали та методи. Методологічну основу аналізу становить трикомпонентна концептуальна матриця Всесвітньої організації охорони здоров'я «ресурси – охоплення – результати». За дизайном робота є порівняльним екологічним дослідженням. Інформаційну базу сформовано з офіційних репрезентативних макроекономічних, фінансових та медико-демографічних даних ВООЗ, Світового банку, ОЕСР, Євростату та Інституту метрики та оцінки здоров'я (IHME) за 2021 рік. Цей часовий інтервал вибрано як останній довоєнний період відносно стабільного розвитку системи охорони здоров'я України, дані якого повністю представлені у світових реєстрах. Проаналізовано три кластери показників: 1) ресурси та фінансування системи охорони; 2) охоплення медичними послугами; 3) результати охорони здоров'я. Аналітичний етап здійснено із застосуванням методів бенчмаркінгу, компаративного, системного та структурно-функціонального аналізу. Фінансові показники порівнювали з використанням паритету купівельної спроможності (ПКС) для нівелювання цінових викривлень. Особливу увагу приділено розрахунку інтегрального індикатора «усувна смертність», для оцінки якого залучено масиви даних Державної служби статистики України за останній доступний рік (2020) щодо кількості померлих за причинами, віком і статтю у розрізі 16 вікових груп. Референтними групами виступили країни Євросоюзу (ЄС), Організації економічного співробітництва та розвитку (ОЕСР), а також групи країн із доходом нижче та вище середнього за класифікацією Світового банку.

Результати. Виявлено глибоку ресурсно-результативну диспропорцію системи охорони здоров'я України за трьома кластерами. За високої макроекономічної частки витрат (8,2% ВВП у 2021 р.) подушне фінансування за ПКС (1 382 дол. США) є суттєво нижчим за рівень ЄС ($5 469) та ОЕСР ($6 364). Головні деформації – низька частка державних витрат (52,1%) та критичний рівень прямих платежів населення (45,3%), що зумовлює високу частоту катастрофічних витрат домогосподарств (17,1%). Попри фінансові обмеження, індекс універсального охоплення послугами становить 74 бали, що перевищує середньосвітовий рівень (67) та орієнтир для країн із доходами нижче середнього (58), зберігаючи базову доступність медичної допомоги. Спостерігається контрастний профіль ефективності: відносна успішність фіксується за тривалістю життя (71,4 року), материнською (26 на 100 тис.), малюковою смертністю (8 на 1000) та смертністю від туберкульозу (9,7 на 100 тис.), які є кращими за середньосвітові показники. Водночас виявлено критичне негативне відхилення за ймовірністю передчасної смерті від неінфекційних захворювань (24,8% проти 12,1% у ЄС), втраченими роками здорового життя (DALY – 36 641 на 100 тис.), що є близьким до середньосвітового рівня (37 090), але вищим, ніж для країн із доходами вище середнього (28 371) та усувною смертністю (410–435 на 100 тис. проти 222–271 у країнах ОЕСР та ЄС).

Висновки. Комплексна оцінка ефективності системи охорони здоров'я України виявляє глибоку невідповідність між ресурсами та результатами діяльності. Значна частка витрат у ВВП не гарантує соціального захисту: дефіцит державного фінансування перекладає тягар на домогосподарства, спричиняючи катастрофічний рівень прямих платежів населення. Попри це, система зберігає базову інфраструктурну доступність (охоплення медичними послугами) та відносну успішність у контролі інфекційних хвороб, материнської й малюкової смертності порівняно зі світовими орієнтирами. Водночас спостерігається критично низька ефективність у боротьбі з неінфекційними захворюваннями, що проявляється у високій передчасній смертності, значному рівні DALY та усувної смертності проти показників ЄС і ОЕСР. Закріплення України у групі країн із доходом вище середнього вимагає переорієнтації реформ із закупівлі обсягів послуг на закупівлю їхньої якості з пріоритетом на первинну ланку та програму реімбурсації для зниження фінансового навантаження на пацієнтів.

Ключові слова: ефективність системи охорони здоров'я, бенчмаркінг, універсальне охоплення послугами, смертність, якої можна уникнути, неінфекційні захворювання, Україна.

Conflict of interest: absent.
Конфлікт інтересів: відсутній.

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Дата першого надходження статті до видання: 27.07.2026
Дата прийняття статті до друку після рецензування: 08.09.2026
Дата публікації (оприлюднення) статті: 28.10.2026