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ANALYSIS OF STATE MACROECONOMIC INDICATORS OF HEALTHCARE SYSTEMS DEVELOPMENT IN REFERENCE COUNTRIES FOR THE DOMESTIC PHARMACEUTICAL MARKET

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Regulation of drug availability is one of the most important areas of state policy in the pharmaceutical market. The use of various methods of price regulation allows achieving the desired socio-economic results, but the complexity of the processes taking place in the pharmaceutical market and in the state necessitates the constant revision of existing approaches and measures.

The aim: *to conduct an analysis of macroeconomic indicators characterizing the state of development of healthcare systems in countries that are reference for the domestic pharmaceutical market.*

Materials and methods. *General theoretical (historical, formal, graphical, hypothetical-deductive, etc.) and applied (organizational-economic, mathematical-statistical, etc.) research methods were used. The subject of the research was the World Bank health indicators, which are integrated with WHO data, and data from the Organization for Economic Cooperation and Development for reference countries (Poland, Slovakia, the Czech Republic, Latvia, Hungary, Romania, Moldova, Bulgaria) and in Ukraine.*

Results*. It was found that for the vast majority of indicators characterizing the state of health care financing, domestic indicators significantly differed from the average values for the group of reference countries. For indicators of domestic health care expenditures (four indicators), domestic data had critically low values (52.12% – % in current healthcare spending, expenditures per capita, including at purchasing power parity of the population – $ 192.81 and $ 570.60, respectively). Only for the indicator of domestic public health care expenditures as a% of general government expenditures, Ukrainian indicators (10.56%) were within the fluctuation range of the corresponding data for the group of reference countries. A comparative analysis of current healthcare expenditures (3 indicators) showed that out of the three indicators, the values of two in Ukraine were close to the minimum values in the group of reference countries. These are current healthcare expenditures per capita, including at purchasing power parity. In Ukraine, the values of these indicators were $369.90 and $1095.06, which were 3.72 and 2.49 times lower than the average values for the group of reference countries. According to the indicators characterizing the participation of private capital and citizens in healthcare expenditures (5 indicators), it was established that per capita private expenditures in Ukraine were $177.10, which was 1.88 times lower than the average for the group of reference countries ($332.58). In terms of private and out-of-pocket expenditures as a% of current healthcare expenditures, domestic data had the highest values compared to reference countries. Thus, private and out-of-pocket expenditures in Ukraine were 1.76 and 1.88 times higher than the average values for reference countries (27.07% and 24.04%, respectively). Domestic out-of-pocket expenditures calculated per capita ($167.54) and at purchasing power parity ($ 495.88) were 44,49% and 17,51% lower than the corresponding average values for the group of reference countries ($301.82 and $ 601.10, respectively). It was found that within the group of reference countries, the drug consumption index varied. This index ranged from $523.0 (Poland) to $883.0 (Bulgaria). The average consumption value in Ukraine for 2021–2023 was ($112.33), which was 5.79 times less than the corresponding data for the group of reference countries. In addition, in the group of reference countries, there are fundamental differences in the structure of population spending on medicines by funding sources (state, private revenues, and health insurance funds).*

Conclusions*. Significant differences in macroeconomic indicators characterizing the state of healthcare financing in the reference countries and in Ukraine have been identified. This necessitates further research on the topic and a review of the group of reference countries used in the domestic pharmaceutical market to regulate the socio-economic accessibility of medicines for the population.*

Keywords*: accessibility of medicines, external reference pricing, regulation of drug prices, healthcare system, pharmaceutical provision of the population, pharmaceutical market.*

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1. Introduction

At the beginning of the new century, many health care systems in economically developed countries realized that achieving equal access to effective medicines for different segments of the population is an unresolved problem. The implementation of the main provi-

sions of the "Health for all" concept over the past 40 years in countries around the world has proven the presence of systemic problems not only in the resource provision of medical and pharmaceutical support for the population, but also in the unjustified use of administrative levers of influence in the drug market [1, 2]. The complexity of the processes taking place in the pharmaceutical market, starting from development and ending with post-marketing monitoring, necessitates the constant revision of existing approaches to regulating the physical (availability) and socio-economic accessibility (affordability) of drugs for consumers. This is especially true for drugs used in the treatment of socially significant and dangerous pathologies, as well as certain groups of patients who are unable to pay for treatment courses on their own [3–5]. The issues of socially effective regulation of the availability of medicines for ordinary citizens become particularly relevant in the context of the reform of the healthcare system, the unstable situation in the country and war. This is the situation that Ukraine is currently in, which has begun a large-scale reform of the industry since 2017 and has been resisting military aggression from a neighbouring country since 2014 [6, 7].

Despite the objective difficulties in the country, at the beginning of 2025, comprehensive measures were introduced to implement mechanisms for regulating the circulation of medicines to increase their availability for the population. The Resolution of the Cabinet of Ministers (CMU) of 04.04.2025 No. 439 "Some Issues of State Regulation of Prices for Medicines" introduced a legislative norm for the simultaneous declaration and summary of prices for drugs, as well as the formation of the National Catalog of Prices for Medicines [8, 9]. The aforementioned document noted that the National Price Catalog is formed based on the results of declaring wholesale prices for medicines, as well as on the mechanisms of their external referencing [8]. The scale and lightning-fast pace of implementation of the process, which has affected practically all segments of the Ukrainian pharmaceutical market, as well as the interests of most of its operators, necessitates the socio-economic need to consider the approaches that were used in the implementation of mechanisms for declaring/referencing drug prices. This has determined the purpose of our research.

The aim of the study is to analyze macroeconomic indicators that characterize the state of development of health care systems in countries that are reference for the domestic pharmaceutical market.

2. Research planning (methodology)

The characteristics of the main stages of conducting research are presented in Table 1. When planning the research, we tried to get as close as possible to the protocol of a systematic review [10], adapting it to the specifics of conducting theoretical and applied research on the specified issues.

It should also be noted that the development of the stages of research considered existing objective limitations, for example, the absence of macroeconomic indicators for Ukraine in global statistical databases since 2022, constant updating of relevant indicators for EU countries, discrepancies between data presented on various global information platforms, etc. In this process, it remained important to comply with the requirement to maintain the level of evidence and relevance of the results obtained, as well as openness, transparency, and the possibility of restoring results during work at all stages of its implementation.

Table 1

Characteristics of the main stages of research

Research planning stages	Content
1	2
1. Preliminary process of reviewing the information base, which highlights the issues of implementing external price referencing in the pharmaceutical market of different countries of the world, as well as in Ukraine	Considering Ukraine's European integration intentions and the list of countries that were referred to as reference countries in 2025, the analysis of literary sources was carried out according to the principles of targeted search. Thus, data on EU countries were used, and the information search was carried out since 2000. In addition, it was necessary to analyze the domestic regulatory framework that regulates the circulation of drugs on the pharmaceutical market at the specified search depth in time
2. Development of a general search strategy, determination of the purpose of its implementation in accordance with the outlined relevance and socio-economic significance of the work	The data search strategy was based, first, on the principles of evidence-based data presented in publications cited in scientometric databases or presented on official websites of international organizations (World Bank, WHO, Organization for Economic Cooperation and Development, Ministry of Health of Ukraine, etc.). Secondly, only those data were compared that were selected according to the same methodology using a single methodological approach during the selection and analysis of the reliability of the data obtained. This allowed for a comparative analysis of macroeconomic indicators that characterize the state of development of health systems in different countries. The lack of data on Ukraine for 2023–2024 in global statistical databases necessitated the comparison of indicators for 2021–2022. Thirdly, the research strategy considered the objective limitations in the resource provision of research conducted without any financial support. Therefore, only statistical databases open to external users were used

Continuation of Table 1

1	2
3. Defining criteria for including/ excluding data from the search database	The search keywords were “drug price referencing”, “external price referencing”, “price regulation”, “drug availability regulation”. Using the above search terms, a general research information base was created at the previous stage of the research, from which materials that did not meet the requirements below were subsequently excluded according to the criteria below. The criteria for excluding data from the research base include: – availability of information in sources that had signs of commercial orientation in various areas (indication of manufacturing companies, trade names of drugs, drug promotion programs in the pharmaceutical markets of reference countries or in Ukraine, etc.); – indicators or other text materials that are presented in information sources to which it is technically impossible to make an active link; – duplicating each other’s materials, which were determined by content or by the presence of links to primary sources; – regulatory and legal documents that were no longer valid at the time of collection and analysis of materials. To avoid duplication of material, all data were exported to Excel spreadsheets and reviewed by independent experts. The group of independent experts included scientists who are not authors of the article but have scientific works in the specified area of research in the organizational and economic direction in pharmacy
4. Research design development	The research was conducted in two main areas: analysis of macroeconomic indicators that characterize the state of development of healthcare systems and pharmaceutical provision of the population in countries that are reference for the domestic drug market; analysis of international practice of external referencing of drug prices and critical analysis of the implementation of this process in Ukraine. One of the key points at the stage of preliminary planning of the research design was the justification of the choice of macroeconomic indicators that characterize the state of financing of medical and pharmaceutical provision of the population, as well as the peculiarities of the development of the drug market. The choice of macroeconomic indicators was carried out according to the following criteria: – the presence of a clear and understandable definition of the content of the indicators, presented on the WHO website, which is integrated with the World Bank database; – direct or indirect impact of indicators on the state of financing of the health care system and the corresponding pharmaceutical provision of the population in the reference countries and in Ukraine; – the presence of indicators in the dynamics of years, which indicates the systematic and consistent nature of their reflection in the WHO/World Bank statistical database. It should be noted that the main requirement for the formation of a set of these indicators was their presentation in a single information base, which was updated and controlled. In addition, the information base had to be public and transparent
5. Conducting analysis, systematization and generalization of the obtained research data	The research involved the collection, analysis, systematization, and generalization of data on the outlined topic in accordance with the principles of openness and the possibility of reproducing and verifying the results
6. Evaluation of the results obtained, determination of objective and subjective limitations of research caused by the action of external and internal factors	At the end, a critical analysis of the results was conducted to identify their limitations, and an assessment of their impact on the relevance of the results was also carried out
7. Outlining areas of prospective research and formulating the main conclusions of the research	The results of prospective studies were determined based on the analysis of the objective and subjective limitations of the studies that were conducted, as well as the possibilities of their use in works on similar topics and issues

3. Materials and methods

Based on the results of preliminary processing of information sources, analysis, systematization and generalization of data, analytical tables with indicators were formed that allow comparing the state of financing of health care systems and pharmaceutical provision of the population in countries that are reference for the domestic drug market. In accordance with the resolution of the Cabinet of Ministers of Ukraine dated 04.04.2025 No. 439 in 2025, these are the Republic of Poland (Poland), the Slovak Republic (Slovakia), the Czech Republic (Czech Republic), the Republic of Latvia (Latvia), Hungary, the Republic of Moldova (Moldova), Romania, the Republic of Bulgaria (Bulgaria) [8]. A total of 12 indicators were selected that characterize the state and structure of financing of the health care system (HC), which also includes the pharmaceutical market. The analysis was carried out according to three groups of indicators:

– domestic public spending on health (conditional group 1 – 4 indicators);

– current spending on health (conditional group 2 – 3 indicators);

– domestic private spending on health (conditional group 3 – 5 indicators).

For the convenience of analysis, each indicator, depending on its group affiliation, was assigned a double number, where the first digit is the analysis group, and the second is the ordinal number within the group, for example, 1.1. Domestic general government health expenditure (% of general government expenditure).

Table 2

Groups of indicators analyzed in reference countries and in Ukraine

Indicator group 1	Indicator group 2	Indicator group 3
1. 1. Domestic general government health expenditure (% of general government expenditure	2. 1. Current health expenditure (% of GDP)	3. 1. Domestic private health expenditure (% of current health expenditure
1. 2. Domestic general government health expenditure (% of current health expenditure)	2. 2. Current health expenditure per capita (current US$)	3. 2. Domestic private health expenditure per capita, (current international $)
1. 3. Domestic general government health expenditure per capita (current US$)	2. 3. Current health expenditure per capita, PPP (current international $)	3. 3. Out-of-pocket expenditure (% of current health expenditure)
1. 4. Domestic general government health expenditure per capita, PPP (current international $)		3. 4. Out-of-pocket expenditure per capita (current US$)
		3. 5. Out-of-pocket expenditure per capita, PPP (current international $)

The specified indicators were selected from the unified information base of indicators from the World Bank's Health Information System, which is integrated with the WHO [11]. The specified approach has already been used in the works of domestic scientists on the organizational and economic direction in pharmacy [12, 13]. Given the lack of data on Ukraine since 2022, all indicators were compared between countries for the specified year. In addition, given the constant updating of data by country, which is carried out in an asynchronous mode, the fixation of indicators was carried out once (May 2025) and subsequently all 12 indicators were not adjusted. It should be noted that at the stage of forming the research information base (the third stage of conducting research in accordance with Table 1), scientists who are not the authors of the article, but have scientific works on the specified research issues in the organizational and economic direction in pharmacy over the past 10 years were included as independent experts. For this purpose, the profiles of representatives of the specified scientific school in the Google Scholar Citations, ORCID, Researcher/Publons (Web of Science), Author Identifier (Scopus), ResearchGateScopus, Web Science Core Collection databases were previously analyzed. The involvement of independent experts was carried out in compliance with the principles of academic integrity, with their verbal consent and on an anonymous basis.

In order to compare data characterizing the state of pharmaceutical provision of the population, data from the report of the Organization for Economic Cooperation and Development (OECD) "Health at a Glance 2025: OECD Indicators" were used on drug consumption indicators and the structure of this indicator (expenditures of the state, private business and citizens or health insurance funds) [14]. The analysis used data from both members (Poland – ISO code POL; Slovakia – SVK; Czech Republic – CZE; Latvia – LVA; Hungary – HUN) and candidates for joining the specified organization, namely Bulgaria – BUR; Romania – ROV. Comparison of data by reference countries was carried out with an objective limitation, which is due to the lack of data on Moldova and Ukraine, which are not members of the OECD.

Two conditional groups of methods were used in the research, namely general theoretical (historical, logical, content analysis, comparative method, induction, synthesis, bibliosemantic, graphic, etc.) and applied (mathematical-statistical, organizational-economic, marketing, etc.). Given the need to formulate conclusions and recommendations based on the analysis of theoretical material, as well as the results of applied research, special attention was paid to the critical approach of interpretative synthesis [15]. The use of this approach allows, at the preliminary stage (information input), as well as at the stage of formulating conclusions based on the results of the research (output), to criticize and question all assumptions that are perceived by the community as appropriate and stable [1, 16, 17].

Against the background of the active development of information technologies, as well as an increase in the level of transparency and accessibility to world statistical databases, data from scientific publications, materials from specialized scientific publications, there is a need to use an adapted approach in conducting organizational and economic research in pharmacy and medicine, which involves, first of all, conducting a comparative analysis of data in different countries of the world. First, when planning the research design, it is necessary to determine clear criteria for selecting countries for the reference group, justify the choice of statistical research bases that are formed on the principles of free access and transparency. The latter is of relevance in the case of conducting scientific research without any financial support. Second, the choice of analysis indicators that are compared across countries must correspond to the content of the outlined research tasks, as, for example, in our case, when macroeconomic indicators were determined that characterize the state of financing of the health care system as a whole and pharmaceutical provision of the population. Thirdly, the design of the conducted research must comply with all the principles of open science. Thus, it can be stated that the approach used in the work and the set of proposed research methods (general theoretical and applied), if the above requirements are met, allow, in our opinion, to achieve the set research goal under existing objective

limitations, such as the lack of expensive software, access to information bases that operate on a commercial basis, staff shortage, etc.

Effective integration of Ukraine into European structures is not possible without a preliminary assessment of the risks and prospects of implementing certain regulatory norms, especially in such socially sensitive areas of activity as medical and pharmaceutical provision of the population. The presented approaches to conducting a comparative analysis of macroeconomic data in countries with different levels of economic development, population incomes, and financing structures of the health care system are, in our opinion, universal in nature and can be applied in various areas of research in medicine, pharmacy, sociology, etc.

The statistical data set was processed using standard statistical analysis packages Statistica (version 12.0, StatSoft, Tulsa, USA) and Excel spreadsheet, and p-value 0.05 was considered as statistically significant. The STATISTICA package is a universal statistical analysis package that implements general and special mathematical methods of data analysis, which allows for various statistical data processing procedures, including descriptive statistics. The specified package was used in the construction of spreadsheets, the analysis of macroeconomic indicators for different countries, data visualization and management, and the construction of graphic material for the article.

4. Research results

Tables 3, 4 present the results of the analysis of macroeconomic indicators in the reference countries and in Ukraine. According to the indicators of group 1, significant differences were established between the data for the group of reference countries and in Ukraine. Indicator 1.2. fluctuated in the reference countries in the range of values from 62.55 USD (Bulgaria) to 86.18 USD (Czech Republic), Ukrainian data (52.12 USD) were 39.31% less than the average value for the group (72.87 USD). In terms of per capita (indicator 1.3.), in Ukraine, healthcare spending had a critically low value (192.81 USD). Thus, in the group of reference countries, this indicator fluctuated in the range of values from 258.10 USD in Moldova to 2060.88 USD in the Czech Republic. The domestic indicator was 4.42 times lower than the average value (853.49 USD) for the reference group. A similar situation was observed for indicator 1.4. Domestic government expenditure on health per capita in PPP in Ukraine was 570.60 USD. At the same time, the average value for the group of reference countries was 1360.23 USD. Thus, the domestic indicator was 2.38 times lower than the average value for the group of reference countries. Only for indicator 1.1. (Domestic general government health expenditure (% of general government expenditure) domestic data (10.56%) were in the range of fluctuations of data for the group of reference countries (from 10.53% in Poland to 17.58% in the Czech Republic).

It is proven that for group of indicators 2 there was a similar situation, but for some indicators the domestic data were either in the range of fluctuations for the group of reference countries or approached them with the lowest values. As we can see from the data in Table 3, indicator 2.1. fluctuated in the range of values from 5.75% in Romania to 9.49% in the Czech Republic, and the average value was 7.59%.

Thus, the domestic indicator (8.20%) exceeded the average value of the specified indicator by only 0.61 analysis units or 8.04%. Indicator 2.2. fluctuated in the range of values from 369.90 USD (Ukraine) to 2498.52 USD in the Czech Republic. The average value for the group of reference countries was 1375.01 USD, i.e. domestic data were 3.72 times lower, but approached the corresponding indicators in Moldova (398.15 USD). A similar situation was observed for the last indicator of this group, so Ukrainian data were the lowest (1094.81 USD) and approached the indicators in Moldova (1095.06 USD). At the same time, they were 2.49 times lower than the average values for the group (2729.95 USD). It should be noted that for all indicators of group 2, the maximum value was characteristic of the Czech Republic, as was the case for group 1.

Table 3

Analysis of macroeconomic indicators for groups 1 and 2 in reference countries and in Ukraine

Analysis indicators by reference countries								
Poland	Slovakia	Czech Republic	Latvia	Hungary	Moldova	Bulgaria	Romania	Ukraine
Indicators group 1								
1. 1. Domestic general government health expenditure (% of general government expenditure								
10.53	13.56	17.58	14.19	11.02	12.35	11.59	11.16	10.56
1. 2. Domestic general government health expenditure (% of current health expenditure)								
72.10	79.73	86.18	69.33	71.22	64.83	62.55	77.67	52.12
1. 3. Domestic general government health expenditure (current US$)								
873.76	1311.93	2060.88	1063.16	885.72	258.1	632.43	700.75	192.81
1. 4. Domestic general government health expenditure per capita, PPP (current international $)								
836.0	1342.0	2153.12	1316.0	998.0	709.88	1607.29	1919.55	570.60
Indicators group 2								
2. 1. Current health expenditure (% of GDP)								
6.68	7.75	9.49	9.04	7.38	6.97	7.66	5.75	8.20
2. 2. Current health expenditure per capita (current US$)								
1225.0	1685.0	2498.52	1898.0	1382.0	398.15	1011.09	902.27	369.90
2. 3. Current health expenditure per capita, PPP (current international $)								
2925.0	2670.0	4249.36	3153.0	2706.0	1095.06	2569.67	2471.56	1094.81

Group of indicators 3 characterizes the state of financial participation of private capital and citizens in the form of payment for the cost of providing services in health care for the provided medical care and pharmaceutical support (Table 4). Indicator 3.1. ranged in the range of values from 128.58 USD in Moldova to 576.34 USD in Latvia, and Ukrainian indicators (177.10 USD) were close to the lowest values. The average value of indicator 3.1. was equal to 332.58 USD in the group of reference countries, which is 87.79% higher than in Ukraine. If we analyze the value of private costs as a% of current costs in health care, then Ukrainian indicators had the maximum values, compared to other reference countries. Thus, indicator 3.2. ranged from 13.82% in the Czech Republic to 47.88% in Ukraine.

As we can see, the participation of Ukrainian citizens and private businesses in paying for medical care and related pharmaceutical support in current health care costs was 1.77 times higher than the average value for the reference groups (27.07%). A similar situation was observed for indicator 3.3, Ukrainian data had the highest values of 45.29%, which is 1.88 times higher than the average value for the group of reference countries (24.04%). In the reference countries, this indicator ranged from 12.73% in the Czech Republic to 35.08% in Bulgaria.

Out-of-pocket health care costs per capita, including PPP (indicators 3.4. and 3.5) for the group of reference countries ranged in the following ranges:

– indicator 3.4 – from 126.35 USD in Moldova to 512.0 USD in Latvia;

– indicator 3.5 – from 347.25 USD in Moldova to 901.34 USD in Bulgaria.

The calculated average values of the indicators for the group of reference countries were respectively 301.82 USD and 601.10 USD. respectively. Thus, the Ukrainian data were 44.49% and 17.51% less than the specified average values of the data for the group of reference countries.

Fig. 1. presents the data of the analysis of drug consumption in the pharmaceutical markets of the reference countries except for Moldova. The specified indicator ranged from 523.0 USD (Poland) to 883.0 USD (Bulgaria). The average value of consumption was 650.42 USD.

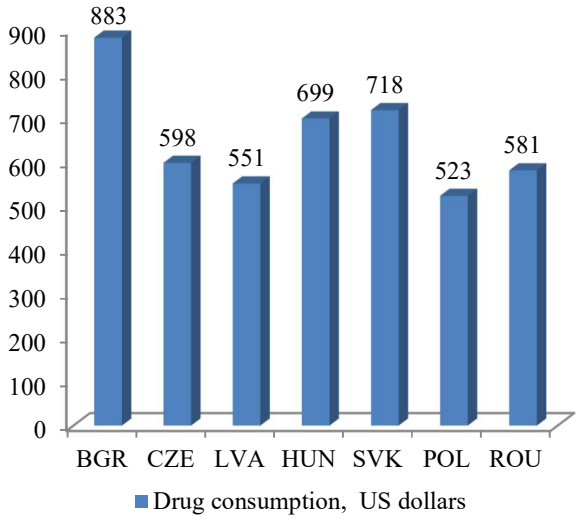

Fig. 1. Analysis of drug consumption indicators in the pharmaceutical markets of reference countries (except Moldova) [14]

According to the report "Pharmaceutical Industry of Ukraine 2023", which is presented in the open information space, the indicator of drug consumption on the domestic market during 2021–2023 was 113.0, 104.0 and 120.0 USD, respectively [18]. Thus, the average value of drug consumption in Ukraine (112.33 USD) was 5.79 times less than the corresponding data for the group of reference countries.

The following Fig. 2 makes it possible to compare data on drug costs according to funding sources (state, private business or citizens, health insurance funds). It is necessary to pay attention to the presence of fundamental differences in the nature of the formation of drug consumption costs within the group of reference countries. Thus, they can be divided into two conditional groups. The first includes those in which state costs in paying for the cost of drug consumption dominate over private ones. These are Bulgaria, Latvia, Poland, Romania, Hungary. In turn, the remaining countries (Slovakia and the Czech Republic) were characterized by a significantly larger state contribution to paying for the cost of drugs consumed by the population on the pharmaceutical market.

Table 4

Analysis of indicators characterizing the financial participation of citizens in paying for the cost of medical care and related pharmaceutical support in reference countries and in Ukraine

Analysis indicators by reference countries								
Poland	Slovakia	Czech Republic	Latvia	Hungary	Moldova	Bulgaria	Romania	Ukraine
Indicators group 3								
3. 1. Domestic private health expenditure per capita, (current international $)								
318.51	330.47	370.21	576.34	335.50	128.58	399.49	201.52	177.10
3. 2. Domestic private health expenditure (% of current health expenditure)								
27.84	20.12	13.82	35.09	27.32	32.60	37.45	22.33	47.88
3. 3. Out-of-pocket expenditure (% of current health expenditure)								
20.31	19.40	12.73	26.99	24.64	31.71	35.08	21.42	45.29
3. 4. Out-of-pocket expenditure per capita (current US$)								
235.0	327.0	317.97	512.0	340.0	126.25	354.65	201.67	167.54
3. 5. Out-of-pocket expenditure per capita, PPP (current international $)								
526.0	518.0	540.79	851.0	667.0	347.25	901.34	529.45	495.88

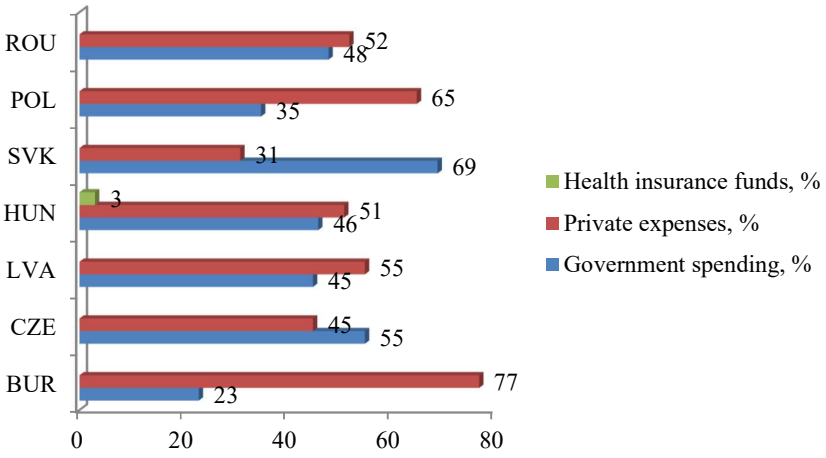

Fig. 2. Analysis of the structure of drug costs in the domestic pharmaceutical markets of reference countries (except Moldova) [14]

5. Discussion of research results

The introduction of external price referencing is a common practice in national health care systems, which is introduced with the aim of regulating prices and achieving their socially determined level for different pharmacotherapeutic groups [2, 19, 20]. According to the data of the specialized literature, a consensus has been reached in the world on the issue of implementing the main principles and approaches in external price referencing in the domestic pharmaceutical market [21, 22]. According to experts, the introduction of external price referencing, as one of the regulators of the socio-economic accessibility of medicines on the market, should be implemented in the following directions:

I. Objectives and scope of the external pricing system (contains three implementation tasks).

II. Administration and operations (five tasks).

III. Methods of conducting external price referencing (four tasks).

IV. Implementation of the results of external reference pricing (two tasks) [21, 22].

Analyzing the content of the above 14 tasks, as well as considering the results of our own research, we can state the following. In direction 1, in the practice of effective external reference pricing, the following is noted. External price referencing systems in the country should be focused on patented drugs, with the aim of their effective pricing and reimbursement [21]. In accordance with the resolution of the Cabinet of Ministers of Ukraine dated 04.04.2025 No. 439, the lion's share of drugs, including over-the-counter drugs, fell under the mechanisms of external referencing and only with the changes that were made by the resolution of the Cabinet of Ministers of Ukraine dated 08.20.2025 No. 1013 were they removed from the scope of the specified regulatory mechanism [8, 9]. The reason for this was the absence of similar trade names of drugs from the over-the-counter group of release in the domestic markets of the reference countries. A logical question arises: how could the regulatory norm, which has been in effect on the Ukrainian pharmaceutical market for almost 5 months, be introduced without a preliminary examination of the possibility of its implementation based on existing reference countries? In addition, the determined reference prices for drugs in most cases were not based on data from the assessment of medical technologies and the rationality of their use (task 1.3. objectives and practices for the effective implementation of external reference pricing).

In goal II, task 2.4. it is stated that the reference countries should be selected based on the similarity of their economic status, goals and organization of the functioning of the health care systems [21]. As we can see from the results of our research, out of the 5 indicators of group 1, only for one indicator (Domestic general government health expenditure (% of general government expenditure) and goals of the health care system) did the domestic data approach the corresponding indicators in the reference countries. The remaining domestic indicators from this group had critically low values, compared to the data of the reference countries. In the group of indicators 2, the Ukrainian data approached the minimum values for the sample of countries, and in the group of indicators 3 (3.2. Domestic private health expenditure (% of current health expenditure); 3.3 Out-of-pocket expenditure (% of current health expenditure) had critically high values (47.88 USD and 45.29 USD, respectively). Analyzing the indicators characterizing the consumption of medicines, it was found that within the group of reference countries there are fundamental differences in the structure of the specified indicator by sources of financing (state, private spending and health insurance funds). In turn, the domestic consumption indicator (112.33 USD) of medicines was 5.79 times lower than the corresponding data for the group of reference countries.

Analyzing the procedure for implementing external reference pricing for medicines in Ukraine since 2016, it was found that the reference countries included exclusively European countries (Table 5). The specified list of countries was stable and since 2016, Poland, Slovakia, the Czech Republic, Latvia and Hungary have been constantly present in its composition.

According to the analysis of international experience in implementing various price regulation mechanisms in the pharmaceutical markets of OECD countries, primarily the data of a survey conducted in OECD countries "Exploring the feasibility of sharing information on medicine prices across countries", 2022), it can be stated that the vast majority of countries use the mechanism of external reference pricing in pharmaceutical markets. In determining the price, the minimum, average price in reference countries, as well as the median of their values, are used [23].

The procedure for determining the list of reference countries also differs, and the composition itself can vary from 3 (New Zealand, Colombia) to 25 (Belgium, Finland, Poland) [23]. As noted in the report and in scientific articles on the subject, a significant threat to the implementa-

tion of this mechanism for regulating prices in domestic markets is their opacity, difficulty in applying in practice, and corruption [23–25]. In addition, focusing on the lowest prices in reference countries is also considered inappropriate [23]. The application of the average price rule in price referencing is considered more effective for the development of the pharmaceutical market and competition in it, and the median can be considered only as an exception in the relevant calculations [21, 22]. Experts determine that none of the countries fulfils all 14 tasks at the appropriate level, which are presented in 4 areas of practice for the effective implementation of external reference pricing [21, 22]. The expected increase in spending on pharmaceutical care for the population [26, 27], especially for socially vulnerable groups and chronically ill people, raises the issue of implementing effective price regulation at the level of priority tasks in shaping the national security of states and social stability [28, 29].

Table 5

Composition of reference cranes on the domestic pharmaceutical market of Ukraine during 2016–2025

Reference countries in the domestic pharmaceutical market in accordance with the specified regulatory legal acts		
Resolution of the Cabinet of Ministers of Ukraine dated 9.11.2016 No. 862 as amended in accordance with the Decree of the Cabinet of Ministers of Ukraine dated 28.07.2021 No. 854	Order of the Ministry of Health of Ukraine dated 05.10.2022 No. 1809	Resolution of the Cabinet of Ministers of Ukraine dated 04.04.2025 No. 439
Republic of Poland, Slovak Republic, Czech Republic, Republic of Latvia, and Hungary. In 2021, the list was supplemented by: Republic of Bulgaria; Greece; Romania	Republic of Poland, Slovak Republic, Czech Republic, Republic of Latvia, and Hungary	Republic of Poland, Slovak Republic, Czech Republic, Republic of Latvia, Hungary, Republic of Moldova, Romania, Republic of Bulgaria

Practical significance. The results of the presented studies can be used in two main directions. First, in the formation of a socio-economic justification for the feasibility of including/excluding countries from the list of reference countries on the domestic pharmaceutical market. As the analysis of the domestic legislative framework showed, the number of reference countries on the domestic pharmaceutical market changed (Table 5). At the same time, there was no data in the regulatory and legal documents that justified, in accordance with the norms of good international practice of external reference pricing [21, 22], the feasibility of selecting a particular country for the group of referents. The absence of such references or the procedure for selecting countries in the documents indicates the use of a formal approach in selecting referents for the domestic pharmaceutical market. We believe that under the conditions of the implementation of a set of regulatory measures from 2025, which cover almost 80.0% of the range of drugs on the domestic pharmaceutical market, the use of such an approach has negative socio-economic consequences. Therefore, the results of our research can be used to make changes and additions to the current regulatory legal acts that regulate the issue of price referencing for medicines in Ukraine.

Secondly, our proposed approach to conducting a comparative analysis of macroeconomic indicators that characterize the state of financing of the health care system in countries with different levels of economic development, population income, and the structure of medical and pharmaceutical expenditures can be used for scientifically based selection of comparison countries for conducting clinical and economic efficiency of the use of various medical technologies. For example, for calculating the threshold of willingness to pay for the use of new innovative drugs, the introduction of new diagnostic measures, etc. Comparison of data in countries that have identical or similar data on the economic state, goals, and organization of the functioning of the health care system (goal II, task 2.4. of good practice of external reference pricing) allows obtaining relevant data that can then be used in practical medicine and pharmacy.

Research limitations. The main limitations in conducting our research and interpreting the results obtained were indicated in the previous sections of the article (“Research planning (methodology)” and “Materials and methods”). It should be noted that the article does not consider the issue of the effectiveness of implementing the external reference pricing mechanism in accordance with all 14 tasks of their implementation in accordance with 4 directions. In 2023, domestic scientists had already conducted such studies [30], so we were faced with the task of analyzing only certain aspects of the implementation of the specified regulatory mechanism from the standpoint of assessing the choice of reference countries for comparing drug prices.

Prospects for further research. Taking into account the European integration course of Ukraine’s development, as well as the main directions of implementation of the “Healthcare System Development Strategy for the period until 2030”, which was approved by the Cabinet of Ministers of Ukraine dated January 17, 2025 No. 34-r, the issue of achieving a socially justified level of drug prices is a priority task of state policy in healthcare. Therefore, the issue of the functioning of the National Drug Price Catalog, as an important regulatory tool in the pharmaceutical market, will not lose its relevance for a long time. An important area of scientific research, in our opinion, soon will be the analysis of the impact of external price referencing mechanisms on groups of drugs that have different medical and social significance and the procedure for dispensing from pharmacies.

6. Conclusions

A well-founded selection of countries that have macroeconomic indicators identical to Ukraine in the health sector significantly increases the likelihood of achieving the goals of state policy in the pharmaceutical market, which are aimed at increasing the socio-econom-

ic accessibility of medicines. As evidenced by the data of the analysis, the reference countries included those that in most cases differed significantly from the Ukrainian data in the groups of analysis of indicators. The existing requirement for comparison with the minimum prices presented in the pharmaceutical markets of reference countries that have different macroeconomic indicators, higher incomes of the population as a whole may have unpredictable consequences for the development of individual segments of the pharmaceutical market in Ukraine. In turn, the increase in regulatory influence on almost all market segments, which occurred in Ukraine in 2025, may have a negative impact on the physical availability of medicines in the future. It will be economically unprofitable for pharmaceutical manufacturers to position their products, which will lead to a decrease in the number of assortment positions and the loss of important medical and social characteristics of the market. Socially justified and economically beneficial reference prices also enable domestic drug manufacturers to form a rational spending policy and forecast future profits. Thus, the choice of reference countries is a responsible process that cannot have a formal approach and must be based on a systemic vision of the processes that are currently taking place in the country, as well as taking into account the prospects for the future drug market and its integration into relevant European structures.

Conflict of interests

The authors declare that they have no conflict of interest in relation to this research, whether financial, personal, authorship or otherwise, that could affect the research and its results presented in this article.

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Data availability

Manuscript has no associated data.

Use of artificial intelligence

The authors confirm that they did not use artificial intelligence technologies in creating the submitted work.

Authors' contributions

Panfilova Hanna: Conceptualization, Methodology, Formal analysis ,Writing – review & editing, Project administration, Supervision; **Matushchak Marta:** Project administration, Investigation, Writing – original draft, Formal analysis; **Samborskyi Oleh:** Conceptualization, Methodology, Formal analysis Investigation, Project administration; **Volkova Alina:** Conceptualization, Methodology, Writing – original draft, Formal analysis, Project administration; **Tereshchenko Lubov:** Investigation, Formal analysis Investigation Validation; **Baihush Yuliia:** Formal analysis, Writing – original draft, Formal analysis, Software; **Simonian Liusine:** Formal analysis, Writing – review & editing, Validation, Project administration; **Martyniuk Tetiana:** Formal analysis, Writing – original draft, Validation, Project administration; **Tsikhon Halyna:** Formal analysis, Writing – original draft, Validation, Software.

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