UDC 615.1:167/168:351.84:615.12:338.5
DOI: 10.15587/2519-4852.2022.265814

COMPARATIVE ANALYSIS OF PHARMACEUTICAL SUPPLY SYSTEMS OF THE POPULATION OF EUROPEAN COUNTRIES ACCORDING TO A COMPLEX OF SOCIO-ECONOMIC INDICATORS

Oleh Samborskyi, Hanna Panfilova, Yuliia Baihush, Liusine Simonian, Iryna Bilyk, Tetiana Martyniuk, Halyna Tsikhon, Vitaly Chernukha

The aim: *to conduct an analysis of the state of functioning of pharmaceutical supply systems for the population in European countries and Ukraine based on a set of socio-economic indicators.*

Materials and methods*. General theoretical (historical, formal, graphic, hypothetical-deductive) and applied (organizational-economic, mathematical-statistical) research methods were used. The object of research was data that was freely available.*

Results*. It was established that the highest volume of the pharmaceutical market volume per inhabitant is typical for Italy (410.18 euros) and the lowest for Ukraine (53.58 euros). It has been proven that with an increase in GDP indicators, which are calculated based on purchasing power parity (PPP) per capita, the range of variation of this indicator by groups decreases, and the number of countries with a negative value of the foreign trade balance also decreases. Within groups of countries, there is a different level of dependence on the import of pharmaceutical products. In Ukraine (the first group), imports exceeded the export data of pharmaceutical products by 8.6 times. For other countries in this group (Latvia, Bulgaria, and Slovakia), imports exceeded exports by 1.3, 1.4, and 4.0 times, respectively. The highest values of the volume of foreign trade in pharmaceutical products were characteristic of the countries of the third and second groups. The undisputed leader is Germany (134,541.0 million euros), in second place is Italy (59,533.0 million euros), and in third place is France (58,568.0 million euros).*

The highest values of health care costs as a percentage of GDP (%) are typical for the countries of the third group and the lowest for the countries of the first group. For all countries, this indicator had a characteristic tendency to increase over time. Growth rates varied both across groups and within groups across countries. According to the indicator of the amount of reimbursement of the cost of drug consumption per person, there was a significant fluctuation of the data by country within the groups. The most extensive range of fluctuations was observed in the third group (284.83 euros). The highest reimbursement amounts are typical for Germany (483.53 euros) and the lowest for Bulgaria (54.25 euros). In most countries, there is a high level (50.0 % and higher) of state participation in the payment of medicine, except for Poland (36.0 %), Lithuania (34.0 %) and Latvia (37.0 %). The lowest values of money consumers spend to pay for medicines (from 13.0 % to 44.0 %) are characteristic of the countries of the third group.

Conclusions*. The established peculiarities of the functioning of the pharmaceutical supply systems of European countries should not diminish the value of the state's aspirations to harmonize the processes that take place to promote medicinal products to consumers*

Keywords*: drug costs, health care costs, reimbursement of drugs, the system of pharmaceutical provision of the population, the pharmaceutical market*

How to cite:
Samborskyi, O., Panfilova, H., Baihush, Y., Simonian, L., Bilyk, I., Martyniuk, T., Tsikhon, H., Chernukha, V. (2022). Comparative analysis of pharmaceutical supply systems of the population of European countries according to a complex of socio-economic indicators. ScienceRise: Pharmaceutical Science, 4 (38), 16–28. doi: http://doi.org/10.15587/2519-4852.2022.265814

1. Introduction

In Ukraine's pharmaceutical supply system (PS), significant positive developments have been increasing the availability of medicines consumed by citizens. Against the background of the development of the global trend toward the expansion of the fundamental guarantees of the state to provide the population with reasonable and, at the same time, affordable pharmaceutical care (PC), the issue of reforming the mechanisms of reimbursement of the cost of drug consumption is important and socially significant [1, 2]. Until 24.02.2022, Ukraine, in this direction, systematically implemented a strategy to expand public guarantees for the provision of affordable medical and PC under rational use of limited resources available in the health care system. Unfortunately, today the state and society face more urgent issues of preserving the statehood and territorial integrity of the country. At the same time, the European integration vector of development, which the country declared back in 2014, remains unchanged, including on the complex issues of reforming

the national health care system and the PS of the population. Therefore, the issues of analyzing the features of the functioning of PS systems in different countries of the European Union (EU) are of strategic importance and socio-economic relevance for Ukraine. At the same time, the PS system of the population of the EU countries in recent years has also undergone many changes associated with the action of a whole range of factors [3, 4]. First of all, the strengthening of the payload on the pharmaceutical market (PM) of the EU countries [5, 6], which have mostly developed mechanisms for regulating the circulation of medicines [7, 8], including reimbursement of the cost of their consumption and create objective prerequisites for revising the modern strategy for the development of the entire PS system of the population. The need to gradually increase public guarantees to provide the population with an affordable PC in the EU countries conflicts with the economic levers of influence of medicine manufacturers on the relevant state institutions [9, 10]. According to international experience, these contradictions become especially painful for society in the case of providing innovative medicines for cancer patients [11], patients with orphan pathologies [12], as well as socially vulnerable groups of the population in countries that have a significant shortage of resources in health care or emergencies, like the coronavirus pandemic [13, 14]. The answer to these challenges was the development and approval (25.11.2020) of a new pharmaceutical sector development strategy (Pharmaceutical Strategy for Europea) for the EU countries. As stated in the document, the effective implementation of the new strategy will allow for forming new models of relations with representatives of the pharmaceutical business and state and public institutions [15]. In addition, thanks to the revision of existing PC regulation regimes in countries, which is scheduled for the end of 2022, it is planned to create favourable conditions for the effective functioning of the entire health care system (European Health Union) [16, 17]. During the implementation of this strategy, it is envisaged to carry out a whole range of reforms in the legislative and regulatory framework governing the provision of PC in EU countries [15, 17]. Attempts to effectively combine the business interests of medicine manufacturers and socio-economic priorities for the development of modern PS systems of the population under the conditions of the existing resource provision of health care allowed to determine the following four priority areas for the implementation of this strategy:

– providing the population with affordable medicines and supporting measures to prevent the development of antibiotic resistance, as well as meeting the needs of patients, especially patients with oncological and orphan pathologies, in affordable medical care;

– support from state institutions for healthy competition on PM, innovative potential of the pharmaceutical industry in the EU countries, which will provide consumers with high-quality, safe, effective and environmentally friendly medicines;

– ensuring favourable conditions for the organization of effective models of supply of medicines, as well as increasing the economic stability of PM subjects in the context of the development of crisis phenomena and their complementarity to the action of regulatory mechanisms in the PS system of the population;

– further promoting the development of processes to improve the quality, efficiency and safety of the use of medicines by consumers [15, 17].

According to experts, soon, the PS system of the population of many EU countries is waiting for fundamental transformations that may have different consequences [17–19]. Taking into account Ukraine's attempts to effectively integrate into the European pharmaceutical space during 2022–2023, the analysis of the experience of implementing systemic transformations that need to be carried out within the framework of the implementation of the above strategy in the EU countries is essential. One of the essential stages of research in this direction is a comparative analysis of the functioning of PS systems of the population in different EU countries, as well as in Ukraine, according to a set of socio-economic indicators. This statement necessitated our research in this direction.

The aim of the research is a comparative analysis of the state of functioning of PS population systems in Europe according to a set of socio-economic parameters.

2. Research planning (methodology)

At the previous stage of our research, it was necessary to build a plan for their implementation. The specified plan, which contains five main stages, is presented in Table 1.

Table 1

List, content and characteristics of the main stages of research

Research stage	Content and a brief description of the stage
1	2
The first stage of research	It was conducting a literary search on the outlined issues (search depth 5–7 years). Identification of previously unresolved issues that require further analysis. Research of legislative and regulatory acts governing the provision of PC in the EU countries and Ukraine at the stage of health care reform. Determination of the socio-economic relevance of research in a specific direction
The second stage of research	Outlining the purpose, definition of the subject, central objects and objectives of the study. Analysis of similar in the direction and problematics of applied research. According to the results of this analysis, the main methods of conducting applied research are outlined. Elimination of possible limitations in conducting further research and interpretation of their results in the experimental plane of their use. Development of general design of applied research. Determination of requirements for the information base that can be used in research. Outlining the leading socio-economic indicators that can be used in research. Collection, critical analysis and preprocessing of statistical data presented in open information sources

Continuation of Table 1

2	3
The third stage of research	Conducting applied research on the complex socio-economic indicators proposed at the previous stage, which characterize the state of functioning of the PS systems of the population in different European countries. Outlining countries and forming reference groups of analysis. Conducting a comparative analysis of data on reference groups of countries and determining the features of the functioning of PS systems of the population in Ukraine and by reference groups. Critical analysis of the results
The fourth stage of research	According to the results of earlier studies, systematization and synthesis of the material. Building the necessary graphic material
The fifth stage of research	Based on the results of the research and considering the possibility of their further use, they outline objective limitations in their interpretation. Determination of the directions of perspective research on the above-described issues and socio-economic significance

3. Materials and methods

Effectively achieving the purpose of our research required outlining the subject and objects of analysis. Thus, the subject of our research has become the PS population systems in different European countries. Object – data of extraordinary literature on the presented topics and statistical indicators that characterize the state of functioning of these systems. In the previous research stage, it was necessary to outline the primary list of countries. Thus, it includes EU members (26 countries as of the beginning of 2022 – without Luxembourg) and non-members of the European Union, namely Norway, Iceland, Switzerland, and the United Kingdom. In addition, candidates for EU membership were included in the specified initial list of countries, namely Turkey (application for EU membership from 1999), Ukraine (2022) and Serbia (2012). As you know, applications for EU membership were also submitted from Albania, Moldova and North Macedonia. These countries, as well as Luxembourg (a member country of the EU), were excluded by us from the primary list of countries, given the incommensurability of their demographic and economic development indicators, compared with other candidates for EU membership.

The next important step in our research was to determine the list of countries that were subject to analysis according to a set of parameters. Thus, on the one hand, a considerable number of them (EU members and non-EU members, as well as candidates for membership) were included in the primary list of countries for objective reasons. On the other hand, the state of functioning of PS systems cannot be described using only one or two analysis parameters. Taking into account the integral nature of the functioning of PS systems, using a set of indicators allows, in our opinion, to systematically analyze their state of functioning and determine the features of development. The above arguments (a significant number of countries in the primary list of countries and the use of a set of analysis parameters) necessitated reducing the number of countries analyzed. Considering that the countries from the primary list differed significantly in terms of economic development, we were tasked with grouping them according to one of the macroeconomic indicators. An important macroeconomic indicator The World Bank uses in the distribution of countries by levels of economic development is the value of GDP calculated at purchasing power parity (PPP), which falls on per capita [20]. Considering that the development and implementation of a new strategy for the development of the pharmaceutical sector of the EU economy took place in 2020, all the necessary statistical data were selected by us for the previous 2019 analysis.

Table 2 presents the indicators of GDP calculated by PPP for European countries that were included in the primary list for 2019 (World Bank data).

Table 2

Indicators of GDP calculated by PPP in the countries of the European region for 2019 [20]

Country	GDP per capita (mil. USD.)
Austria	58076.3
Belgium	54278.4
Bulgaria	24497.6
United Kingdom	49041.5
Greece	30356.3
Denmark	58701.0
Estonia	37851.3
Ireland	87379.1
Iceland	58290.1
Spain	41695.1
Italy	44376.2
Cyprus	42338.9
Latvia	31883.3
Lithuania	38540.8
Malta	47407.9
Netherlands	59004.3
Germany	55625.9
Norway	66799.2
Poland	33797.8
Portugal	36172.1
Romania	31867.3
Serbia	18822.4
Slovak Republic	31966.6
Slovenia	40670.9
Turkey	26867.5
Hungary	33514.9
Ukraine	13345.4
Finland	50321.5
France	49072.4
Croatia	30543.9
Czech Republic	42847.0
Sweden	54598.8
Switzerland	72033.9

In the future, considering the data of Table 2, we have grouped countries. The purpose of statistical grouping is the division of the total population into distinct homogeneous groups according to specific quantitative characteristics [21]. In our case, such a quantitative feature was the GDP indicator of countries calculated by PPP (indicator *x*). Taking into account the fact that the varying feature *x* changed smoothly and gradually, in the grouping of countries, we used equal intervals, and the formula determined the width of the interval n:

$$h=(x_{max}-x_{min})/m,$$

where x_{max}, x_{min} – the largest and smallest value of the trait in the aggregate, and *m* – the number of analysis groups [21].

At the same time, critically high (Ireland, Switzerland) and low values (Ukraine, Serbia) values of the corresponding indicators were previously excluded from the calculations. In total, we planned to form 3 reference groups of analysis (Table 3). Subsequently, using an integrated approach, it was necessary to select those countries for which further research was conducted in the aggregate of analysis groups. The choice of countries was carried out according to the parameters of the historical identity of their development, and the peculiarities of the organization of the principles of functioning of national health care systems.

Table 3

Results of ranking countries by GDP per capita (2019)

The first group of countries	The second group of countries	The third group of countries
The interval values of the country's GDP per PPP per capita (intern. USD.)		
From 24497.6 to 35898.73	From 35898.74 to 47299.87	From 47299.88 to 55701.01 and higher
Bulgaria	Estonia	Austria
Greece	Italy	Belgium
Latvia	Spain	United Kingdom
Poland	Cyprus	Denmark
Romania	Lithuania	Malta
Slovak Republic	Malta	Germany
Turkey	Portugal	Netherlands
Hungary	Slovenia	Norway
Croatia	Czech Republic	Finland
		France
		Sweden
Only 9 countries	Only 9 countries	Only 11 countries
Countries with a critically low* and a high** value		
The country's GDP per capita (intern. USD.)		
Serbia*	Total 9 countries	Ireland**
Ukraine*		Switzerland**
Only 2 countries		Only 2 countries
TOTAL 11 countries		Total 13 countries

Thus, the first reference group of countries (low values of GDP per capita) a priori included Ukraine, as well as Bulgaria, and Latvia. In addition, countries (Poland, Hungary, and the Slovak Republic) were selected, following the order of the Ministry of Health of Ukraine No. 139 of 22.01.2020, registered by the Ministry of Justice of Ukraine No. 133/34416 of 06.02.2020, are defined as reference prices in the calculation of the maximum wholesale prices for medicines [22]. The second group of countries with an average GDP per capita of PPP consisted of the Czech Republic, Estonia, Lithuania, Italy, Spain and Slovenia. It should be noted that the Czech Republic also belongs to the group of reference countries in calculating the maximum wholesale prices for medicinal products following the above order of the Ministry of Health of Ukraine [21]. Cyprus, Malta and Portugal were removed from the second reference group as countries with little potential for the development of the pharmaceutical sector of the economy compared to other countries and did not significantly affect the development of the European drug market [23, 24]. Finally, the group with relatively high GDP values for PPP per capita was formed by countries characterized by developed economies and stable traditions of social protection of citizens, a high level of development of the pharmaceutical sector of the economy as a whole and PM in particular [25, 26]. These are, first of all, Finland, Sweden, Norway, France, Germany and the United Kingdom. Thus, each reference group of the analysis contained six countries of analysis.

The following important, from a methodological point of view, stage of research was the determination of a set of indicators by which it was planned to conduct a comparative analysis of PS systems of the population by country. Considering that the PS system of the population in the classical definition appears as an integral structure in which the economic and social levers of influence on society are dialectically combined, we have chosen exactly two groups of analysis indicators. The first group includes indicators that make it possible to characterize the economic component in the activities of PM subjects, and the second group includes those that allow, in our opinion, to assess the effectiveness of the social burden that is assigned to the PS system of the population as a whole and pharmacies in particular. Thus, to the first, we attributed such indicators as the volume of PM per inhabitant of the country, the amount of export and import operations for pharmaceutical products, foreign trade balance, foreign trade turnover, and production volume [27]. The second set of indicators included – total healthcare costs from GDP (%), reimbursement of the cost of consuming medicines in general and in terms of one consumer (outpatient care) and structure (%) of medicines costs by funding sources (state or compulsory health insurance funds) – CMIF; funds of voluntary medical insurance – VMI; cash expenditures of citizens). The choice of indicators of the second group was based on an analysis of the content and modern content of relations between the state or public funds (medical insurance, public organizations) and end users of medical and pharmaceutical services. Thus, at present, under conditions of increasing the requirements of society for the quality of medical and pharmaceutical care, the state and public institutions cannot fully meet the population's need for appropriate services in the health care system, including PS. This is an objective reality due to the limited nature of resources in the health care system. The solution to this problem is seen not only in the systematic

increase in the level of expenses allocated by the state for medical and pharmaceutical support of the population but in the application of an integrated approach to the rational use of resources, primarily with the introduction of reimbursement mechanisms for medicines, attracting additional sources of funding.

After conducting a preliminary analysis of the data presented in the open information space, we decided to use the reports of the International Federation of Pharmaceutical Manufacturers and Associations (IFPMA) [23, 24] and data from the official website of the Organization for Economic Co-operation and Development (OECD) (Table 4) [28].

OECD data were used in the analysis of the structure (%) of medicine costs by funding sources: the state or CHIF funds, VMI funds and cash expenditures of citizens (data from OECD Health Statistics 2019) [28].

Table 4

Volumes of national PCs of European countries were used in the calculations (IFPMA data) [23, 24]

Country	PM volume in (at ex-factory prices) (€ million)
Austria	4583.0
Belgium	5988.0
Bulgaria	1210.0
United Kingdom	23279.0
Greece	5158.0
Denmark	3111.0
Estonia	344.0
Ireland	2279.0
Iceland	147.0
Spain	17105.0
Italy	24099.0
Cyprus	177.0
Latvia	384.0
Lithuania	793.0
Malta	196.0
Netherlands	5770.0
Germany	40456.0
Norway	2621.0
Poland	7281.0
Portugal	3409.0
Romania	3130.0
Serbia	725.0
Slovak Republic	1455.0
Slovenia	675.0
Turkey	6891.0
Hungary	2631.0
Ukraine [29]	2245.0
Finland	2712.0
France	29304.0
Croatia	957.0
Czech Republic	3010.0
Sweden	4313.0
Switzerland	5533.0

IFPMA reports present statistical data calculated by country according to a single methodology so that they can be used in comparative analysis. The source of information on Ukraine was the data presented on the official website of the State Statistics Committee of Ukraine [29]. It should be noted that for some indicators, there were no domestic data. Therefore, recalculation of domestic indicators in euros was carried out at the official rate of the National Bank of Ukraine as of 10.01.2019 (Euro – UAH 32.2139/EUR).

In our research, we used theoretical (historical, formal, graphic, generalization, hypothetical-deductive, grouping) and applied (organizational, economic, mathematical, statistical) research methods. Statistical data were processed using the Statistical analysis package (version 12.0, StatSoft, Tulsa, USA).

In the study of dynamic series of indicators that changed over time, for example, total healthcare costs from GDP (%), we analyze the growth rates (%) and growth rates (%) of these data and the range of fluctuations in indicators within the group was characterized by a variational scope ($R=X_{max}-X_{min}$). The average values of the indicators used in the analysis were calculated by the formula of the average chronological (У=((*x*1:2)+*x*2+…+ *xn*–1+(*xn*:2)):*n*–1).

A p-value<0.05 was considered statistically significant.

4. Research results

The results of the analysis of PM volumes per inhabitant of the country according to the reference groups of analysis are shown in Fig. 1–3. Attention is drawn to a significant fluctuation in this indicator in the first reference group. Thus, the variational scope of this indicator was 216.63 €, in the second group – 177.16 €, and in the third – 179.19 €. In the first group, the minimum values of the indicator were observed in Ukraine (53.58 €), and the maximum values – were in the Slovak Republic (270.21 €). In the second group, the minimum value of 233.02 € was observed in Lithuania, and the maximum – in Italy (410.18 euros).

In turn, in the third group of countries, the minimum values were typical for the UK (387.76 €) and the maximum values for Norway (566.95 €). Thus, in the first group of countries, the data in the Slovak Republic were 5.0 times higher than the corresponding domestic indicators. In contrast, Italian data were only 1.8 times higher in the second group of countries than in Lithuania. Finally, in the third, the data in Norway exceeded the UK's figures by 1.5 times. That is, the lower the value of the country's GDP calculated per capita, the higher the indicator of the variational scope of PM/one inhabitant of the country.

The active development of modern PM necessitates increasing the competitiveness of pharmaceutical manufacturers and developing and implementing new, innovative medicines [30, 31]. Under the conditions of globalization of the world economy, this significantly increases the foreign economic potential of the pharmaceutical industry of countries and creates favourable conditions for solving urgent problems of world health development. Table 5 shows the data of the analysis of the foreign economic activity of countries by reference groups. Analyzing the data in this table, it should be noted that the countries of the third reference group in the majority (except for Finland) had a positive trade balance. In the second group of countries, such a characteristic of foreign trade activity was inherent in only two countries, and these are Italy and Slovenia.

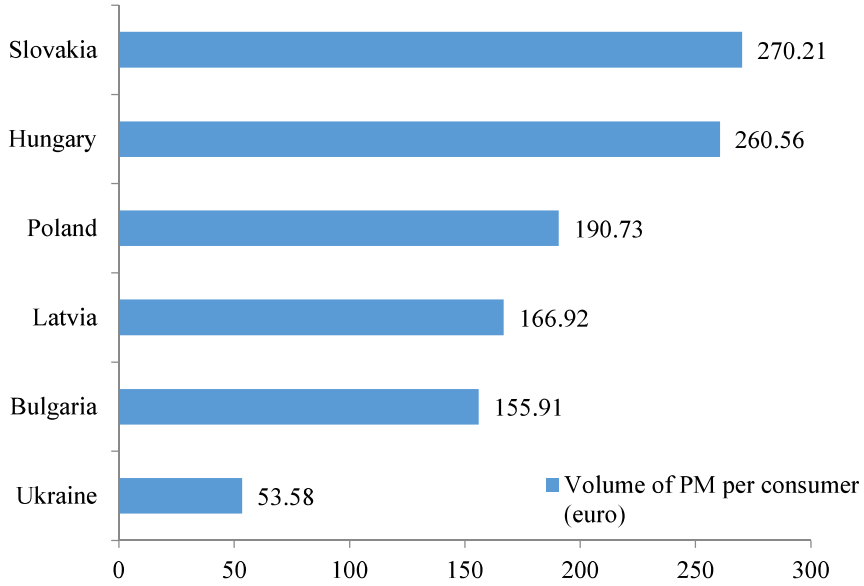

Fig. 1. Analysis of indicators of PM volumes calculated per capita of the country according to the first reference group of analysis (six countries)

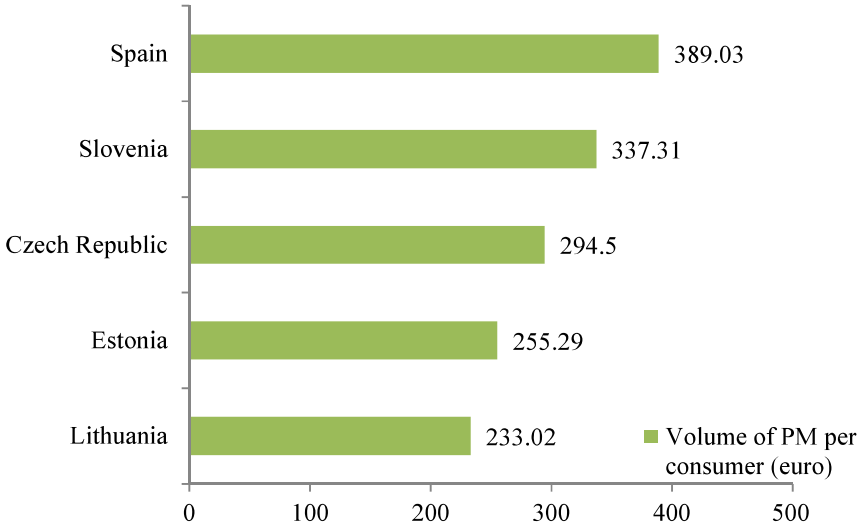

Fig. 2. Comparative analysis of indicators of PM volumes calculated for one country resident for the second (six countries) reference group of analysis

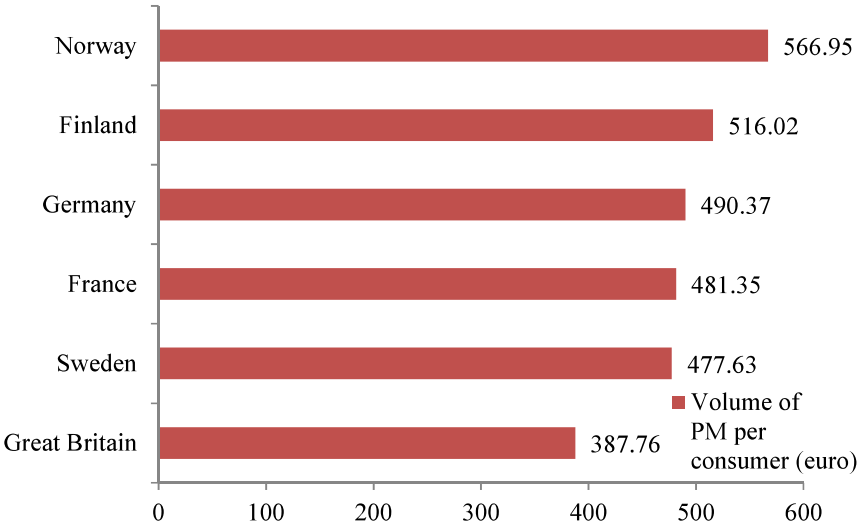

Fig. 3. Study of PM volume indicators calculated per capita for the third (six countries) reference group of analysis

In the countries with relatively low GDP values calculated per capita, all countries (except for Hungary) had a negative trade balance. The highest values of the negative foreign trade balance were observed in Poland, in the second group – in Spain. In the first group, the country's significant dependence on imports of pharmaceutical products (the ratio of imports to exports) is observed in Ukraine (8.6 times imports fall over the number of exports).

Further, with a significant margin, data on the Slovak Republic are presented (4.0 times, respectively). Among the countries of the second reference group, which, like most countries of the first group, had a negative value of the foreign trade balance, the most significant importance of the prevalence of the amounts of import operations over the export of pharmaceutical products was characteristic of Estonia (5.2 times). In our opinion, the value of this ratio in Finland is interesting. Thus, in this country, the number of import operations over the indicators of exports of pharmaceutical products differed by 3.0 times. If we analyze the data of foreign trade turnover of countries by reference groups, we can say the following. The highest values of this indicator in the first reference group are typical for Hungary (10604.0 € million), in the second – for Italy (59533.0 € million), and in the third group – for Germany (134541.0 € million). Thus, it can be argued that the presented data again demonstrated a significant difference in foreign trade activity in the world market in reference groups and within the groups themselves in different countries. This is due to the action of a whole range of factors, among which the state of development of the pharmaceutical industry is of great importance. Unfortunately, due to the absence of the specified IFPMA report of data on pharmaceutical production volumes in some countries for 2019, this indicator for reference groups is not possible [23, 24]. At the same time, it should be noted that countries with a positive foreign trade balance value in the reference groups had the highest rates of pharmaceutical production compared to other countries represented in the corresponding group. Regarding phar-

maceutical production, the first positions were taken by two countries, represented in the third and second reference groups, respectively. These are France (35848.0 € million) and Italy (34000.0 € million).

Table 5

Analysis of indicators of foreign economic activity of the countries of reference groups in the world pharmaceutical market

Countries by analysis groups	Export of pharmaceutical products (€ million)	Import of pharmaceutical products (€ million)	Foreign trade balance (€ million)	Foreign trade turnover (€ million)
The first group of countries				
Bulgaria	1038.0	1471.0	–433.0	2509.0
Latvia	498.0	665.0	–167.0	1163.0
Poland	3688.0	6906.0	–3218.0	10594.0
Slovak Republic	462.0	1865.0	–1403.0	2327.0
Hungary	5916.0	4688.0	1228.0	10604.0
Ukraine	256.0	2187.0	–1931.0	2443.0
The second group of countries				
Estonia	99.0	520.0	–421.0	619.0
Italy	31666.0	27867.0	3799.0	59533.0
Spain	11953.0	14767.0	–2814.0	26720.0
Lithuania	806.0	1243.0	–437.0	2049.0
Slovenia	4985.0	4002.0	983.0	8987.0
Czech Republic	2852.0	4960.0	–2108.0	7812.0
The third group of countries				
United Kingdom	25717.0	25369.0	348.0	51086.0
Germany	81862.0	52679.0	29183.0	134541.0
Norway	1964.0	1382.0	582.0	3346.0
Finland	669.0	1985.0	–1316.0	2654.0
France	32556.0	26012.0	6544.0	58568.0
France	32556.0	26012.0	6544.0	58568.0
Sweden	9918.0	4391.0	5527.0	14309.0

Further, Germany was represented by a small margin (33158.0 € million, the third reference group of the analysis). According to the State Statistics Committee of Ukraine, in the country in 2019, the country produced essential pharmaceutical products and pharmaceuticals (21 – Code according to KVED-2010) for UAH 37425.4 million [29], which in terms of the official rate of the NBU is approximately 1165.0 € million. In terms of own production of pharmaceutical products, Ukrainian data can be compared with the indicators presented in Slovenia (the first reference group) and Norway, Finland (the third reference group). Thus, summing up the results of the analysis on indicators that make it possible to assess the state of development of the PS systems of the population from an economic point of view, we can say the following. Countries that were part of the reference groups for economic indicators had more common characteristics than those countries that were represented in different analysis groups. This indicates the critical influence of macroeconomic indicators of the development of countries on the effectiveness of the functioning of the economic component of the PS systems of the population of European countries.

The next stage of our research was the analysis of the second group of indicators that allowed us to assess the level of effectiveness of the social burden that is assigned to the subjects of pharmaceutical activity in countries. These are the total healthcare costs of GDP (%), reimbursement amounts for the cost of consuming medicines in general and per consumer (outpatient care), and the structure (%) of medicine costs by funding sources (state or CHIF funds; VMI funds; citizens' cash expenditures). According to the dynamics of indicators of total healthcare expenditures from GDP (%) for different countries, we also calculated the average values of this indicator for 2000–2019 (Table 6).

As you can see, the highest values for 2019 were characteristic of the countries represented in the third reference group. In this group, according to 2019 data, this macroeconomic indicator fluctuated in a small range of values, namely from 9.1 % (Finland) to 11.7 % (Germany) – the variation span was 2.6 %. Countries from this group are also characterized by the maximum values of the average value of total healthcare costs from GDP (%). In this case, this indicator ranged from 9.35 % (Sweden) to 10.98 % (Germany). In the second group, this figure for 2019 ranged from 6.8 % (Estonia and Lithuania) to 9.0 % (Spain) – the variation span is 2.2 %. From 2000–2019, the average value of indicators ranged from 6.15 % (Estonia) to 8.5 % (Spain). For the countries represented in the first reference group in 2019, the indicator of healthcare costs from GDP (%) had the lowest values (excluding the Slovak Republic) compared to countries from other analysis groups.

Thus, it ranged from 6.3 % (Poland and Latvia) to 6.9 % (Slovak Republic), respectively, the average values (for 2000–2019) – from 5.74 % (Poland) to 6.9 % (Hungary). The average values of the analyzed indicators are shown in Fig. 4. It should be noted that in all groups of analysis, there was a positive, from a socio-economic point of view, dynamics of increasing this indicator over time. At the same time, the rate (%) of growth of these indicators by reference groups differed. Thus, the highest values of group rate (%) of growth are observed in the third reference group, and the lowest according to countries from the first group of analysis.

The highest individual growth rates (%) were typical for Hungary. However, attention is also drawn to fluctuations between the data for 2019 and their average values in groups of countries. So, in the first group, it is only 0.05 %, in the second it is already 0.57 %, and in the third group, it is 0.85 %.

For countries, we calculated the corresponding indicators per consumer according to the sum of reimbursement of the cost of consuming medicines (outpatient care) in general. The results of the analysis by country in accordance with their reference groups are given in Table 7. As we can see from the presented data, in terms of the amount of reimbursement of the cost of consumed medicines per inhabitant of the country, there is a rather exciting difference both in groups and within groups in different countries. Thus, traditionally the lowest rates were typical for countries from the first group (Poland, 54.80 €) and the highest – for representatives of the third group (Germany, 483.53 €).

Table 6

Analysis of the dynamics of changes in the indicator of total healthcare costs from GDP (%) in Europe

Country	Total healthcare expenditures (%) of the country's GDP	
	Average values for 2000–2019	Data for 2019
The first reference group of analysis		
Bulgaria	–*	–*
Latvia	6.4	6.3
Poland	5.74	6.3
Slovak Republic	6.68	6.9
Hungary	6.9	6.4
Ukraine	–*	–*
The second reference group analysis		
Estonia	6.15	6.8
Italy	8.22	8.7
Spain	8.5	9.0
Lithuania	6.58	6.8
Slovenia	8.3	8.3
Czech Republic	6.26	7.8
The third reference group analysis		
United Kingdom	9.38	10.3
Germany	10.98	11.7
Norway	9.30	10.5
Finland	8.73	9.1
France	10.85	11.2
Sweden	9.35	10.9

*Note: * – data in the information source [23, 24] are missing*

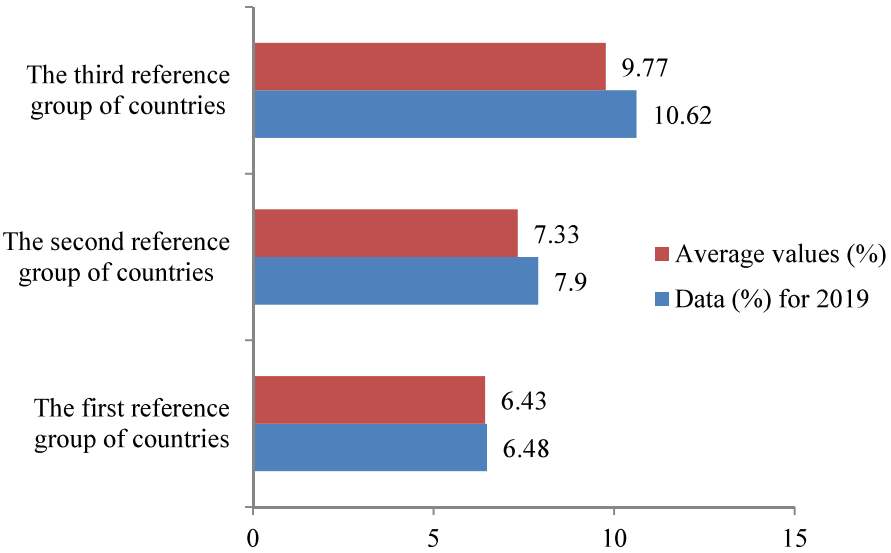

Fig. 4. The average value of total healthcare expenditures (%) of GDP (%) and according to 2019 data in European countries by reference groups of analysis

At the same time, this indicator fluctuated in a significant range of values in the middle of the reference groups. For example, in the first group, from 54.25 € (Bulgaria) to 241.61 € (Slovak Republic) – the variation span is 187.36 €. In the second, from 99.61 € (Lithuania) to 245.5 € (Spain) – the variational scope is 145.89 €, and in the third, from 198.7 € (UK) to 483.53 € (Germany) – the span is 284.83 €.

A significant fluctuation of this indicator in groups and within groups in different countries is a consequence of the action of a whole range of factors. This issue requires, in our opinion, further research separately for each country. Furthermore, the data presented in Table 7 reflect the diversity of models and mechanisms for reimbursement of the cost of consumption of medicines that operate in different national health systems. Considering the above, it seems incorrect to calculate and analyze the average values of reimbursement amounts for the cost of medicines by reference groups.

In light of the results we presented above, it is logical to analyze the structure (%) of medicine costs by funding sources: the state or CHIF funds, VMI funds, and cash expenditures of citizens (data from OECD Health Statistics 2019) [28]. Analyzing the indicators presented in Fig. 5–7, it can be argued about the different levels of participation of the state or public institutions (CHIF funds) in the payment of the cost of consumption of medicines, both by reference groups and within them by country of analysis. The lowest value of this indicator is typical for Lithuania (34.0 %) and the highest for Germany (84.0 %). At the same time, within the third group there are countries in which the financial burden associated with the consumption of medicines is almost equally distributed between the state/funds of CHIF and the end user. These are, for example, Sweden, Norway, Finland (the corresponding ratio is: 53.0 %÷47.0 %; 56.0 %÷44.0 %; 55.0 %÷45.0 %). The dominant role of public and public funds in reimbursement of the value of medicines in all analysis groups belongs, as mentioned earlier, to Germany (84.0 %) and France (80.0 %). These countries have been rebuilding socially oriented models of the functioning of medical and PS systems for several centuries. They have, at the moment, significant success in achieving humanistic goals for the development of society.

It is necessary to note the insignificant financial participation of VMI programs in the payment of the cost of medicines by the countries we analyzed. Thus, this insurance market segment was represented in Slovenia (26.0 %), and it had a slight impact on the Hungarian PM (3.0 %).

In our opinion, the most interesting results were obtained in the second reference group. In addition to Lithuania and Slovenia, the financial burden associated with the consumption of medicines in the countries of this group was relatively proportionally distributed between the state/funds of CHIF and end users. The largest share (%) of expenditures associated with public or public funds in the case of drug consumption was observed in Italy (62.0 %). Moving to the first group of analysis, the share (%) of public funds or CHIF programs in medicines spending is gradually decreasing, except for data presented in the Slovak Republic and Hungary. For example, this figure in Poland and Latvia reaches only 36.0 % and 37.0 %, respectively.

Table 7

Analysis of reimbursement amounts of the cost of consumption of medicines (outpatient care) in Europe and recalculations per consumer in accordance with the reference groups of the analysis

Analysis indicator (€ million) by country according to groups The total amount of reimbursement for the cost of consumption of medicines (€ million)/in terms of one consumer (€)					
The first group of analysis					
Bulgaria	Latvia	Poland	Slovak Republic	Ukraine	Hungary
421.0/54.25	170.0/73.90	2092.0/54.80	1301.0/241.61	–	1188.0/117.64
The second group of analysis					
Estonia	Spain	Italy	Lithuania	Slovenia	Czech Republic
155.0/115.0	10794.0/245.5	7690.0/130.88	339.0/99.61	342.0/170.91	2142.0/209.57
The third group of analysis					
United Kingdom	Germany	Norway	Finland	France	Sweden
11929.0/198.7	39892.0/483.53	1157.0/250.27	1551.0/295.11	24220.0/397.87	2426.0/268.66

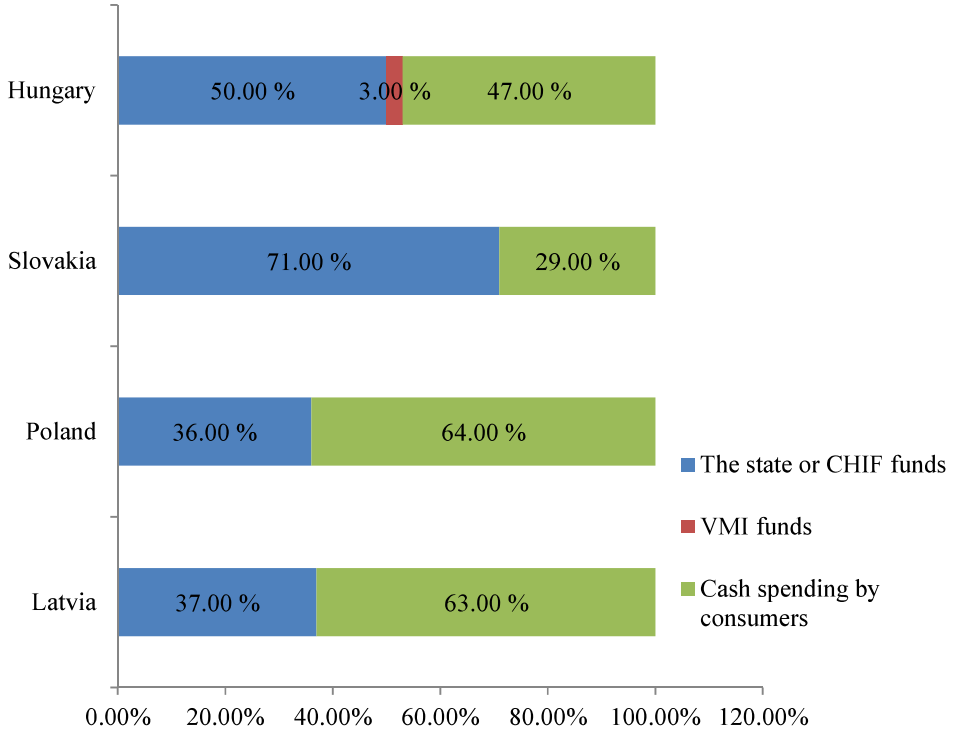

Fig. 5. Analysis of the cost structure for medicines in the countries of the first reference group

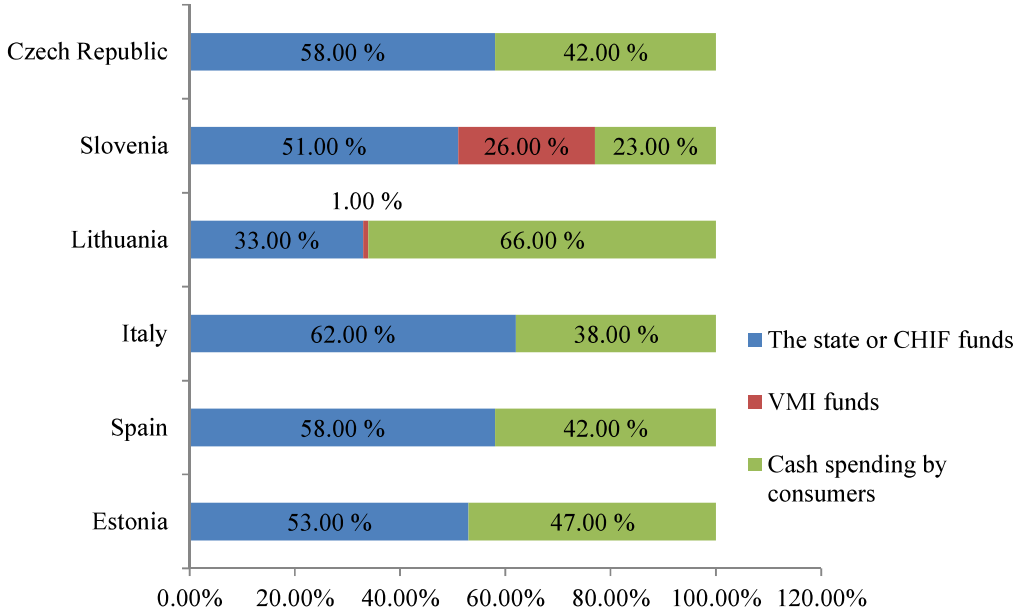

Fig. 6. Structure of medicines costs in the countries of the second reference group

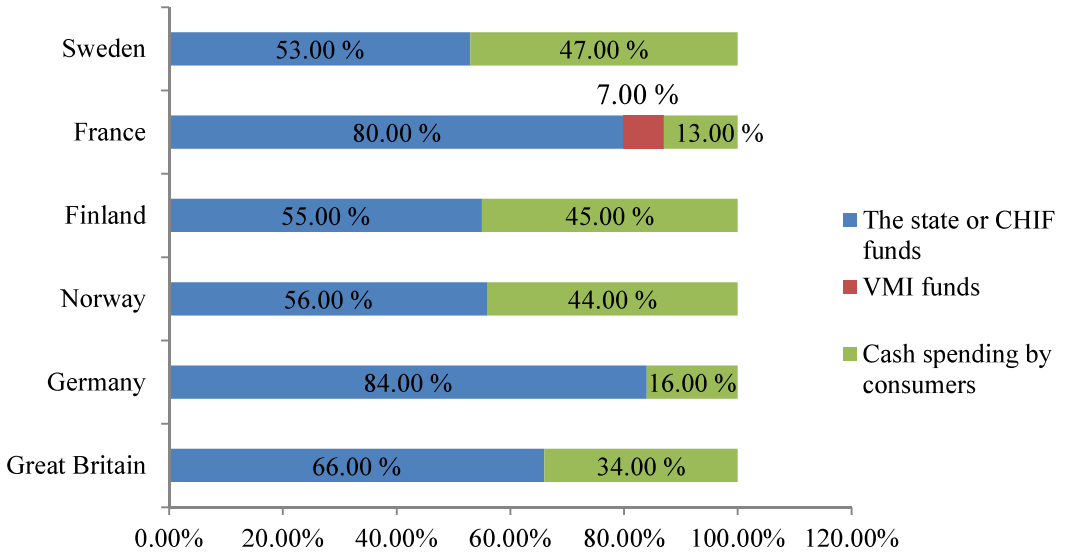

Fig. 7. Features of the cost structure in the consumption of medicines in the countries of the third group

5. Discussion of research results

Systematizing the research results, it is necessary to assert the following. It is proved that with an increase in GDP indicators calculated for PPP per capita, the variational scope of data on the volume of PM per capita decreases, and the number of countries with a negative foreign trade balance also increases. The presence of critically low data on this indicator in Ukraine casts doubt on the ability to effectively meet the needs of the population in an accessible PC and further actively integrate into the European economic environment. Thus, in the first group, 5 countries out of 6 had a negative value of the foreign trade balance, in the second – 4 out of six. In the third group, for only one country (Finland), the number of imports prevailed over the indicators of its exports of pharmaceutical products. Within the reference groups, there is a different level of dependence of the PS systems of the population on the import of relevant products. For example, in Ukraine (the first reference group), the import rate was 8.6 times higher than the data on exports of pharmaceutical products. For comparison – for the countries from the first reference group, which also had a negative balance, the number of imports exceeded the values of export indicators of pharmaceutical products at 1.3 (Latvia), 1.4 (Bulgaria), in 4.0 (Slovak Republic). The second reference group that observed significant import dependence was observed in Estonia (5.2 times). In the Czech Republic, the number of imports exceeded the export of pharmaceutical products by 1.7 times, in Lithuania – by 1.5 times, and in Spain – only by 1.2 times. Logical, from an economic point of view, is also the fact that the highest values of foreign trade volume were characteristic of countries that are represented in the third and second groups of countries. So, the undisputed leader is Germany (134541.0 € million), in the second position is represented by Italy (59533.0 € million), and in third France (58568.0 € million). It should be noted that the countries from the third reference group demonstrated significant activity in foreign trade activities on PM.

We proved that the countries that were characterized by a positive value of the foreign trade balance had the highest values of pharmaceutical production volumes in the group. These are, first of all, France (third group of analysis, production volume – 35848,0 € million), Italy (second group, 34000.0 € million) and Germany (third group, 33158,0 € million).

The analysis of PS systems according to the group of economic parameters allows us to conclude about the significant impact of macroeconomic indicators on the state of development of the pharmaceutical sector of the country's economy.

According to the group of indicators that make it possible to assess the state of efficiency of the functioning of various PS systems of the population from a social point of view, it is possible to distinguish those that, like the previous economic parameters, to a certain extent depend on GDP indicators calculated for PPP per capita. This is such an essential macroeconomic indicator as the cost of health care from GDP (%). We found that the highest rates of healthcare expenditures from GDP (%) are represented in the third (UK, Sweden, Norway, Germany, France and Finland) and the lowest in the first (Slovak Republic, Poland, Latvia, Hungary) reference group of analysis. As indicated earlier, this indicator fluctuated in a small range of values in the third reference group, in contrast to the countries represented in the second and first groups of analysis. Vivacious, from a socio-economic point of view, is the presence of a tendency to a systematic increase in this indicator over time. This was typical for all countries without exception. At the same time, the rate (%) of this growth differed in groups and within different countries.

The following two indicators (reimbursement amounts for the cost of consuming medicines in general and in terms of one consumer (outpatient care) and the structure (%) of expenses for the consumption of medicines by sources of funding), in contrast to previous indicators, largely depend on the type of the health care system itself and the historical features of its functioning, the role of the state in organizing the provision of medical and pharmaceutical care, the effectiveness of reim-

bursement mechanisms for the cost of consuming medicines, the development of the health insurance market, and so on. That is, having relatively comparable economic indicators that characterize the state of development of the PS system within the same reference group, different countries had differences within the same reference group according to the above indicator. Thus, in terms of the amount of reimbursement of the cost of consuming medicines in terms of one consumer (outpatient care) within one group, there was a significant fluctuation in data – from 145.89 € (second group) up to 284.83 € (third reference group). The fluctuation of this indicator in the first reference group was 187.36 €. The corresponding German figures (483.53 €) were 9 times higher than the corresponding data calculated in Bulgaria (54.25 €). Taking into account the significant role of state and public institutions in the social support of the health of the German population, as well as taking into account the historical aspects of the development of the health care system itself in this country, the results as mentioned earlier of the analysis are logical and understandable.

The analysis of the structure of the financial burden associated with the consumption of medicines also demonstrated the diversity of the functioning of population PS models in different countries within the reference groups. At the same time, it is possible to identify some characteristic features of countries that are represented in reference groups. First, there is a low level of participation of funds in VMI in paying the cost of medicines in all countries. Thus, under VMI programs, the cost of medicines was paid in 2019 only in Hungary (3.0 %), Slovenia (26.0 %), Lithuania (1.0 %) and France (7.0 %). The principles of humanism, laid down in the basic state-building documents of European countries, are reflected in the significant influence of the state and social institutions in the organization of the population of medical and PC. Thus, the share (%) of state expenditures and CHIF funds in the vast majority of countries we analysed was more than 50.0 %. The only exceptions are data in Poland (36.0 %), Lithuania (34.0 %) and Latvia (37.0 %). Attention is drawn to the fact that in the group of countries with the highest GDP values calculated by PPP per capita (third group), there are the lowest values of cash costs in the payment of the cost of medicines (from 13.0 % to 44.0 %). This indicates a fairly high efficiency of reimbursement mechanisms for the cost of consuming medicines in these countries. It should also be noted that in Norway, Finland and Sweden, the cost of medicines is almost equally distributed between the state/local self-government and citizens.

Study limitations. Among the main limitations in using the research results we obtained are the following. Firstly, in ranking countries, we used only one indicator (GDP calculated per capita). Given that population PS systems appear as complex, hierarchically constructed macroeconomic structures, this approach can artificially narrow the scale and depth of scientific research in different countries. Secondly, the use of one source of information for most indicators, the IFPMA report, in which there were no data on Ukraine, did not make it possible to conduct an appropriate analysis of the group of social indicators. This, in turn, reduces the level of opportunities for the practical use of the results obtained, which, against the background of granting the country the status of a candidate for EU membership, has particular relevance. Thirdly, the reimbursement amounts of the cost of consuming medicines that we have calculated for one resident of the country may not always adequately reflect the effectiveness of the entire model of compensation for medicines. This is because, in some countries, reimbursement of the cost of medicines is carried out not for all groups of patients and categories of the population but separate programs and lists. Finally, to conduct a macroeconomic analysis, the above indicator may have the right to exist. However, if it is necessary to assess the effectiveness of the functioning of these models, specifically by country, it is necessary to conduct a more detailed analysis.

Prospects for further research. All the limitations mentioned above in our research allowed us to outline the directions of good work. Thus, it is planned to analyze the effectiveness of the functioning of the population identical in organizational structure and type of financing of PS systems in Europe. In the future, it is necessary to dwell separately on the analysis of various models of reimbursement of the cost of medicines that operate in the European space to determine their positive features and functioning problems. A separate direction can also be considered the possibility of conducting similar studies on domestic data and on a group of countries that, following the order of the Ministry of Health of Ukraine No. 139 of 22.01.2020, registered by the Ministry of Justice of Ukraine No. 133/34416 of 06.02.2020, dated 06.02.2020, are classified as a group of reference countries in the calculations of maximum wholesale prices for medicines [21]. Such studies are particularly relevant in the context of the increasing social burden on pharmacies, which is now observed worldwide and in Ukraine [32, 33]. In addition, the presence of significant fluctuations in indicators for reference groups, as well as within groups in different countries, also necessitates further research. In general, it should be noted that the intensification of Ukraine's aspirations for integration into the EU, on the one hand, and the growing need of Ukrainian consumers for affordable medicines, on the other hand, necessitates organizational, economic and marketing research in a wide range of areas.

6. Conclusions

The innovative and commercial attractiveness of the European PM certainly creates favourable conditions for its active development and its effective integration into the world economic space [25, 34]. At the same time, the peculiarities of the functioning of national PS systems of the population in different countries, due to historical, economic, and social factors, should not negate the objective desire of states to harmonize at all stages of the process of promoting medicines on the commodity network on PM.

Conflict of interests

The authors declare that they do not have a conflict of interest concerning this study, including financial, personal nature, authorship or other nature that could affect the study and its results presented in this article.

Financing

The presented research was carried out without financial support from public funds or individuals.

Acknowledgements

The conducted research was carried out within the framework of the implementation of the research plan, which is carried out at the Department of Pharmaceutical Management and Marketing and Organization and Economics of Pharmacy of the National University of Pharmacy (NUPh), as well as the Department of Pharmaceutical Management, Drug Technology and Pharmacognosy of Ivano-Frankivsk National Medical University. The theoretical basis for these studies was laid by scientists representing the organizational and economic school of NUPh.

References

1. Lakdawalla, D. N. (2018). Economics of the Pharmaceutical Industry. Journal of Economic Literature, 56 (2), 397–449. doi: https://doi.org/10.1257/jel.20161327

2. Pezzola, A., Sweet, C. M. (2016). Global pharmaceutical regulation: the challenge of integration for developing states. Globalization and Health, 12 (1). doi: https://doi.org/10.1186/s12992-016-0208-2

3. Rogers, D., Rogers, B., Lewis, J., Lewis, E. (2018). The UK pharmaceutical in¬dustry braces for Brexit, be it mild, severe, or doomsday. Medical Writing, 27 (4), 41–45.

4. Espin, J., Schlander, M., Godman, B., Anderson, P., Mestre-Ferrandiz, J., Borget, I. et. al. (2018). Projecting Pharmaceutical Expenditure in EU5 to 2021: Adjusting for the Impact of Discounts and Rebates. Applied Health Economics and Health Policy, 16 (6), 803–817. doi: https://doi.org/10.1007/s40258-018-0419-1

5. Drummond, M., Towse, A. (2019). Is rate of return pricing a useful approach when value-based pricing is not appropriate? The European Journal of Health Economics, 20 (7), 945–948. doi: https://doi.org/10.1007/s10198-019-01032-7

6. Batt, S. (2016). Pharmaceutical Company Corruption and the Moral Crisis in Medicine. Hastings Center Report, 46 (4), 10–13. doi: https://doi.org/10.1002/hast.575

7. Eger, S., Mahlich, J. C. (2014). Pharmaceutical regulation in Europe and its impact on corporate R&D. Health Economics Review, 4 (1). doi: https://doi.org/10.1186/s13561-014-0023-5

8. Shaikh, M., Del Giudice, P., Kourouklis, D. (2020). Revisiting the Relationship Between Price Regulation and Pharmaceutical R&D Investment. Applied Health Economics and Health Policy, 19 (2), 217–229. doi: https://doi.org/10.1007/s40258-020-00601-9

9. Panteli, D., Arickx, F., Cleemput, I., Dedet, G., Eckhardt, H., Fogarty, E., Kaitelidou, D. (2016). Pharmaceutical regulation in 15 European countries. Health Systems in Transition, 18 (5), 1–118.

10. Maynard, A., Bloor, K. (2015). Regulation of the pharmaceutical industry: promoting health or protecting wealth? Journal of the Royal Society of Medicine, 108 (6), 220–222. doi: https://doi.org/10.1177/0141076814568299

11. Hawkes, N. (2014). Cancer Drugs Fund receives boost but will no longer fund “overpriced” drugs. BMJ, 349 (sep01 8), g5382–g5382. doi: https://doi.org/10.1136/bmj.g5382

12. Mestre-Ferrandiz, J., Palaska, C., Kelly, T., Hutchings, A., Parnaby, A. (2019). An analysis of orphan medicine expenditure in Europe: is it sustainable? Orphanet Journal of Rare Diseases, 14 (1). doi: https://doi.org/10.1186/s13023-019-1246-7

13. Urbinati, D., Rémuzat, C., Kornfeld, Å., Vataire, A.-L., Cetinsoy, L., Aballéa, S., Mzoughi, O., Toumi, M. (2014). EU pharmaceutical expenditure forecast. Journal of Market Access & Health Policy, 2 (1), 23738. doi: https://doi.org/10.3402/jmahp.v2.23738

14. Lee, I.-H., Bloor, K., Hewitt, C., Maynard, A. (2014). International experience in controlling pharmaceutical expenditure: influencing patients and providers and regulating industry – a systematic review. Journal of Health Services Research & Policy, 20 (1), 52–59. doi: https://doi.org/10.1177/1355819614545675

15. Communication from the commission to the European Parliament, the council, the European economic and social committee and the committee of the regions Pharmaceutical Strategy for Europea. Pudlic Health. European Commission. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52020DC0761

16. Piachaud-Moustakis, B. (2022). The European Union’s New Pharmaceutical Strategy for Europe. Pharmaceutical Technology, Pharmaceutical Technology, 46 (7), 7–8. Available at: https://www.pharmtech.com/view/the-europe-an-union-s-new-pharmaceutical-strategy-for-europe

17. Pinto, C. M., Roy, F. (2021). Revision of the EU General Pharmaceuticals Legislation – Public Consultation is now Open. Hogan Lovells.

18. Shaikh, M., Del Giudice, P., Kourouklis, D. (2020). Revisiting the Relationship Between Price Regulation and Pharmaceutical R&D Investment. Applied Health Economics and Health Policy, 19 (2), 217–229. doi: https://doi.org/10.1007/s40258-020-00601-9

19. Godman, B., Fadare, J., Kwon, H.-Y., Dias, C. Z., Kurdi, A., Dias Godói, I. P. et/ al. (2021). Evidence-based public policy making for medicines across countries: findings and implications for the future. Journal of Comparative Effectiveness Research, 10 (12), 1019–1052. doi: https://doi.org/10.2217/cer-2020-0273

20. GDP per capita, PPP (current international $). The World Bank. Available at: https://data.worldbank.org/indicator/NY.GDP.PCAP.PP.CD

21. Fang, J.-Q. (Ed.) (2017). Handbook of Medical Statistics. Sun Yat-Sen University.

22. Pro vnesennia zmin do Poriadku rozrakhunku hranychnykh optovo-vidpusknykh tsin na likarski zasoby, yaki vyznacheni u pereliku likarskykh zasobiv, shcho vkliucheni do Natsionalnoho pereliku osnovnykh likarskykh zasobiv ta na yaki vstanovliuiutsia hranychni optovo-vidpuskni tsiny (2020). Nakaz MOZ Ukrainy No. 139. 22.01.2020. Available at: https://zakon.rada.gov.ua/laws/show/z0133-20#Text

23. The Pharmaceutical Industry in Figures (2021). International Federation of Pharmaceutical Manufacturers and Associations. Available at: https://www.efpia.eu/media/602709/the-pharmaceutical-industry-in-figures-2021.pdf

24. The pharmaceutical industry and Global health facts and figures 2021 (2021). International Federation of Pharmaceutical Manufacturers and Associations, 102. Available at: https://www.ifpma.org/wp-content/uploads/2021/04/IFPMA-Facts-And-Figures-2021.pdf

25. Rashidian, A., Soleymani, F., Cheraghali, A., Kebriaeezade, A., Kheirandish, M. (2015). A review of pharmaceutical policies in response to economic crises and sanctions. Journal of Research in Pharmacy Practice, 4 (3), 115–122. doi: https://doi.org/10.4103/2279-042x.162361

26. Barfoed, C. (2016). The Attractiveness of the European pharmaceutical market and its explanatory factors. Copenhagen Business School, 135. Available at: https://research-api.cbs.dk/ws/portalfiles/portal/58432276/camilla_barfoed.pdf

27. Mazaraki, A. A. (2014). Mizhnarodna ekonomika. Part 1. Kyiv: Kyiv. nats. torh.-ekon. un-t, 564.

28. Health at a Glance 2019 (2019). Health at a Glance. doi: https://doi.org/10.1787/4dd50c09-en

29. State Statistics Service of Ukraine. Available at: https://www.ukrstat.gov.ua/

30. Batraga, A., Kite, M., Duboviks, J., Salkovska, J. (2020). Possible consequences of Brexit on European pharmaceutical market. New Challenges in Economic and Business Development – 2020: Economic Inequality and Well-Being, 54–64. Available at: https://dspace.lu.lv/dspace/bitstream/handle/7/54169/Batraga_A_Kite_M_Duboviks_J_Salkovska_J_NC_2020.pdf?sequence=1&isAllowed=y

31. Valverde, J. L. (2016). The globalization of medicines as a challenge for governments. Pharmaceuticals Policy and Law, 18 (1–4), 19–29. doi: https://doi.org/10.3233/ppl-160429

32. Kotvitska, A., Volkova, A., Korzh, I., Surikova, I. (2021). Comparative analysis of indicators that determine the effectiveness of the implementation of socio-economic determinants of health in Europe and Ukraine. ScienceRise: Pharmaceutical Science, 3 (31), 34–41. doi: https://doi.org/10.15587/2519-4852.2021.235787

33. Bondarieva, I., Malyi, V., Posilkina, O., Mala, Z., Nessonova, M. (2021). Scientific and methodological approaches to modeling the optimal strategy for increasing the competitiveness of pharmacy chains of different sizes. ScienceRise: Pharmaceutical Science, 4 (32), 59–66. doi: https://doi.org/10.15587/2519-4852.2021.239389

34. Rémuzat, C., Urbinati, D., Kornfeld, Å., Vataire, A.-L., Cetinsoy, L., Aballéa, S., Mzoughi, O., Toumi, M. (2014). Pharmaceutical expenditure forecast model to support health policy decision making. Journal of Market Access & Health Policy, 2 (1), 23740. doi: https://doi.org/10.3402/jmahp.v2.23740

Received date 25.08.2022
Accepted date 18.10.2022
Published date 31.10.2022

Oleh Samborskyi, PhD, Associate Professor, Department of Pharmaceutical Management, Drug Technology and Pharmacognosy, Ivano-Frankivsk National Medical University, Halytska str., 2, Ivano-Frankivsk, Ukraine, 76018

Hanna Panfilova*, Doctor of Pharmaceutical Sciences, Professor**,** Department of Organization and Economics of Pharmacy**,** National University of Pharmacy**,** Pushkinska str., 53, Kharkiv, Ukraine, 61002

Yuliia Baihush, PhD, Assistant**,** Department of Chemistry, Pharmaceutical Analysis and Postgraduate Education, Ivano-Frankivsk National Medical University, Halytska str., 2, Ivano-Frankivsk, Ukraine, 76018

Simonian Liusine, PhD, Assistant, Department of Organization and Economics of Pharmacy, National University of Pharmacy, Pushkinska str., 53, Kharkiv, Ukraine, 61002

Iryna Bilyk, PhD, Assistant**,** Department of Pharmaceutical Management, Drug Technology and Pharmacognosy**,** Ivano-Frankivsk National Medical University**,** Halytska str., 2, Ivano-Frankivsk, Ukraine, 76018

Tetiana Martyniuk, PhD, Associate Professor**,** Department of Cosmetology and Aromology, National University of Pharmacy**,** Pushkinska str., 53, Kharkiv, Ukraine, 61002

Halyna Tsikhon, Assistant**,** Department of Pharmaceutical Management, Drug Technology and Pharmacognosy**,** Ivano-Frankivsk National Medical University**,** Halytska str., 2, Ivano-Frankivsk, Ukraine, 76018

***Corresponding author**:* Hanna *Panfilova, e-mail: panf-al@ukr.net*