



Analysis of Ukrainian Pharmaceutical Market Retail Segment Development

Hanna Panfilova¹, Natalia Bogdan^{2*}, Liliia Gala³, Liusine Simonian¹, Oksana Tsurikova¹

¹. Faculty of Pharmacy, Department of Organization and Economics of Pharmacy, National Pharmaceutical University, Ukraine.

². Faculty of Pharmacy, Department of Pharmacy, Bukovinian State Medical University, Chernivtsi, Ukraine.

³. Faculty of Pharmacy, Department of Organization and Economics of Pharmacy, Bogomolets National Medical University, Kiev, Ukraine.

***Corresponding Author: Natalia Bogdan**

Abstract

The pharmaceutical market is an important part of the system of pharmaceutical provision of the country. In modern conditions, the pharmaceutical market performs many functions, among which the social function is one of the most important. The aim of our study was to analyze the dynamics of the development of the Ukrainian pharmaceutical market in the conditions of the socio-economic and financial crisis in the country. We conducted dynamics analysis of pharmacy sales development in retail sector of pharmaceutical market (2011-2017). We used historical, comparative, logical, graphical, and mathematical-statistical methods of scientific search. As a result of studies we have found that during 2011-2017 the retail segment of Ukrainian pharmaceutical market had zigzag-shaped development dynamics. We distinguished three main stages of its development. So, during the first stage (2011-2013), we observed positive growth dynamics of pharmacy sales expressed in hryvnia, U.S. dollar, and package pieces. What is more, increase of pharmacy sales' indicators, expressed in hryvnia and U.S. dollar, did not differ significantly. The second, the most difficult, period lasted for two years (2014-2015). This period was characterized with decrease of sales' volume, expressed in U.S. dollar and in natural indexes (package pieces). In 2015 the lowest indexes of pharmacy sales, expressed in U.S. dollar (22.75 million U.S. dollars), and in natural indexes (1507.1 million of package pieces), were observed. Increase (38.0%) of sales' volumes, expressed in hryvnia, which was observed in 2015, was due to devaluation of national currency. The third stage of market development started in 2016 and is continuing still. In the retail segment an increase in volume of pharmacy sales, expressed in hryvnia – by 22.0%, in U.S. dollar – by 4.0%, and in package pieces – by 6.0%, has been observed from 2016. In the conditions of relative stabilization of U.S. dollar rate in 2017, growth of sales' volume in U.S. dollar was 17.0%, and in natural indexes – only 5.0%. Gradual slowdown of one sale weighted average cost growth, beginning in 2016, is an important positive characteristic of pharmacy sales market development. For example, in 2015 this index grew by 41.0%, in 2016 – by 16.0%, and in 2017 – only by 10.0%. Of special note is the fact of gradual increase of sales' volume per capita, expressed in U.S. dollar? For example, in 2015 this index was 36.04, in 2016 – 37.24, and in 2017 – 44.09 U.S. dollars. Retail segment of Ukrainian pharmaceutical market, in the conditions of political and social-economical crisis in the country, has shown the complex nature of its development. Devaluation of national currency in the conditions of high dependence of Ukrainian pharmaceutical market on import significantly influenced the dynamics of pharmacy sales. In these conditions Ukrainian consumers of pharmaceutical services should not be left alone with the problem of significant increase of prices of medical products. Implementation of systemic reforms in health protection, and development of consistent state policy of Ukrainian pharmaceutical market development and medicines' consumption regulation provide the real way out of this situation.

Keywords: Pharmacy sales, Ukrainian pharmaceutical market, Ukraine, Weighted average sales' Cost, retail segment of Ukrainian pharmaceutical market.

Introduction

Beginning in 2014, deep political and social-economic changes took place in Ukraine. They affected all spheres of activity [1, 2]. In 2017 the country's government stated its serious intentions to reform Ukrainian health protection [3, 4]. Pharmaceutical market is an important component of the health protection system of any country. This is a structure of macro economical complex of the country that is dynamically developing [5, 6, 7]. The pharmaceutical market is a place where interests of pharmaceutical companies, consumers of services, state, manufacturers, distributors, pharmacies and other economic agents overlap [8, 9, 10, 11]. Any changes that happen in the health protection system, and also on the society in general, have a direct influence on the development of pharmaceutical market and network of pharmacies in the country [5, 12, 13]. All of the negative changes that happen in the economics and health protection have especially acute influence on the retail segment of the market. Pharmacy, as an end body of a complex distribution network, has a key position in the system of pharmaceutical supply of the population [5, 6, 14, 15].

The dynamics of pharmacy sales of medicinal products and of pharmaceutical assortment in particular fully reflects the changes of availability indexes of pharmaceutical help that is rendered to the population [5, 6, 16, 17, 18, 19]. That's why the goal of our study was to analyze the development dynamics of retail segment of Ukrainian pharmaceutical market over the years (2011-2017).

Materials and Methods

Study Design

We conducted dynamics analysis of sales of products in pharmacies in retail sector of Ukrainian pharmaceutical market during 2011-2017. Ukraine has no single monitoring system of main development indexes of the pharmaceutical market that would reflect their dynamics over the years in a centralized way [20, 21, 22]. That's why we used the data from the pharmaceutical market analytical research system called "PharmXplorer"/"Фармстандарт" ("Pharmstandard") of the company "Proxima Research".

When this system forms the base of statistical data, it uses a consistent methodological approach. That's why we think that the choice and analysis of indexes

that are given in this base over the years is justified. From 2014 and till 2017 the indexes of pharmacy sales volume were given without including the data for the Autonomous Republic of Crimea and some territories of Donetsk and Luhansk oblast', that are temporarily not under Ukrainian control. These territories have official status of "uncontrolled" by Ukraine [23].

We have identified the following indexes for analysis: volume of sales of products in pharmacies expressed in national currency (hryvnia); volume of sales in pharmacies expressed in U.S. dollar; volume of sales in pharmacies expressed in natural indexes (packaging pieces); weighted average cost of one sale in pharmacies in retail prices; pharmacy sales per capita, expressed in national currency (hryvnia/capita); pharmacy sales per capita, expressed in U.S. dollars (U.S. dollars/capita); pharmacy sales per capita, expressed in natural indexes (packaging pieces/capita). As we can see, evaluation of nature of the development dynamics of retail segment of Ukrainian pharmaceutical market was conducted not only in national currency, but also in U.S. dollar.

Carrying out of analysis of development dynamics of retail segment of Ukrainian pharmaceutical market in this direction was due to these reasons. Starting from 2014, the country is in a state of severe political, financial and social-economic crisis. During the period from 2011 to 2017 devaluation of hryvnia by a factor of 3.43 was observed in Ukraine, and in 2014 the government of Ukraine decided to deregulate the rate of the national currency against the U.S. dollar [23, 24]. As a result, during 2014 the average weighted exchange rate of the national currency against the U.S. dollar was changing in a wide range on a monthly basis, from 814.92 hryvnias (01.01.2014) to 1564.70 hryvnias (01.12.2014) for 100 U.S. dollars [24].

To convert the volume of pharmacy sales to U.S. dollars, data about average weighted exchange rate of the national currency against the U.S. dollar (monthly values) was used. The given indexes were presented in the archive of the interbank foreign exchange market of Ukraine. This archive can be found on the official site of the Ukrainian national

bank and of the Ministry of Finance of Ukraine [24].

We think that change analysis of pharmacy sales per capita dynamics is interesting because of the following reasons. During several decades already a negative tendency of population decrease is observed in Ukraine [25, 26]. All the necessary indexes that we used in the intermediate calculations are given in the Table 1.

Statistical Analysis

When analyzing the dynamics of indexes that were used during the study we used the growth (%) of indexes, and also growth (k) rates. We calculated base growth rate values (kbase) (data for 2017 in relation to the corresponding data for 2011) and chain growth rates (kchain) (data for following year in relation to the corresponding data for the previous year). All statistical calculations were performed using the statistical package Stat Soft. Inc.(2014). STATISTICA version 12.0 and Excel spread sheet. A p-value <0.05 was considered as statistically significant.

Table 1: Dynamics analysis: indexes that were used for intermediate calculations

Baselines by years of research						
2011	2012	2013	2014	2015	2016	2017
Average weighted exchange rate of the national currency of Ukraine (hryvnia) against the U.S. dollar (100 U.S. dollars) for the studied years/ k chain (chain growth rate)						
798.18/-	806.48/ 1.01	811.86/ 1.01	1190.83/ 1.47	2162.93/ 1.82	2538.91/ 1.17	2655.06/ 1.05
Population of Ukraine, thousands of people/ k chain						
45778.53/ -	45663.64/ 0.99	45553.05/ 0.99	45426.25/ 0.99	42929.30/ 0.95	42760.52/ 0.99	42444.92/ 0.99

Results

In the period from 2011 till 2013 a positive growth dynamics of sales volumes expressed in the national currency, U.S. dollar and in natural indexes (package pieces) was observed. It should be noted that the growth rates of pharmacy sales' volume in national currency and U.S. dollar were not significantly different. The sales volumes in hryvnia in 2012 increased, in comparison with 2011 data, by 17.0%; in U.S. dollar – by 15.0%. In 2013 the pharmacy sales volumes in hryvnia increased by 13.0%; in U.S. dollar – by 12.0%. Pharmacy sales expressed in natural indexes were characterized by lower growth rates. For example, in 2012 the pharmacy sales expressed as quantity of packages increased only by 5.0%, in comparison with 2011 data, and on 2013 –

only by 2.0% (Table 2). In 2014 serious qualitative and quantitative changes happened with Ukrainian pharmaceutical market [3, 4, 21, 27]. These changes were due, primarily, to annexation of Autonomous Republic of Crimea, beginning of active fighting in the East of the country, and also to the deep political and social-economic crisis that affected all spheres of activity of the society [1, 2, 23, 28]. For historical reasons, Ukrainian pharmaceutical market is strongly dependent on the import of medical products and devices [20, 21, 23, 28]. For this reason devaluation of the national currency in relation to the U.S. dollar that was observed in 2014 strongly affected the sales volumes of products in pharmacies.

Table 2: Analysis of development dynamics of retail segment of Ukrainian pharmaceutical market in 2011-2017

2011	2012	2013	2014	2015	2016	2017
Sales volume of products in pharmacies (mln. of hryvnias)/ kchain						
27173.5/-	31793.0/ 1.17	35846.1/ 1.13	35569.6/ 0.99	49215.3/ 1.38	59969.5/ 1.22	73042.9/ 1.22
Sales volume of products in pharmacies (mln. of U.S. dollars)/ kchain						
34.05/-	39.27/ 1.15	44.15/ 1.12	29.87/ 0.68	22.75/ 0.77	23.62/ 1.04	27.51/ 1.17
Sales volume of products in pharmacies (mln. of packages)/ kchain						
1875.6/-	1960.0/ 1.05	1992.3/ 1.02	1764.6/ 0.89	1507.1/ 0.85	1592.6/ 1.06	1672.23/ 1.05
Weighted average cost of one sale in pharmacies (retail prices, hryvnia)/ kchain						
14.50/-	16.2/1.12	18.0/1.11	23.1/1.28	32.6/1.41	37.7/1.16	41.3/1.10

As we can see in the Table 1, in 2014, in comparison with 2011 data, hryvnia devaluated, on average, by 49.19%. Besides that, in April of 2014 in Ukraine value-added

tax for medical products (7.0%) and devices (20.0%) was adopted. All of the reasons listed above affected the indexes of sales volumes of products in pharmacies in 2014. That said,

we observed inertness of retail market segment. It was reflected in the fact that product sales, expressed in the national currency, decreased only by 1.0%, and in U.S. dollar – by 32.0%. When comparing the sales volumes in U.S. dollar for 2014 with the data for 2011 we determined the following. In 2014 in the retail segment of pharmaceutical market the cost of realized goods, in monetary terms (U.S. dollar), was lower by 12.3%. In our opinion, the analysis of pharmacy sales volumes, when expressed in natural indexes, is more demonstrative. For example, in 2014, in comparison with 2013 data, 11.0% less product packages were realized. Increase of sales volumes of product in 2015, when expressed in national currency, by 38.0%, in comparison with 2014 data, was due to the significant wholesale and retail prices increase for medical products, especially for the imported ones, and also for the products from pharmaceutical assortment. Besides that, the national currency of the country continued to devalue.

For example, in 2015, in comparison with 2014 data, the national currency devaluated by 81.6% in average. We can see that, judging by the data from Table 2, the specified increase of sales volume in hryvnia happened on the background of realization decrease of products, when expressed in natural indexes, by 15.5% (from 1764.6 mln. of packages in 2014 to 1507.1 mln. of packages in 2015). In 2015 the volume of sales in U.S. dollar in the retail segment of pharmaceutical market continued to decrease. In 2015 the index of pharmacy sales volume in U.S. dollar was 33.2% less than by 2011 data. As early as 2016 a positive trend of sales volume increase started to emerge in the retail segment of Ukrainian pharmaceutical market; the increase was not only in the national currency, which is logical on the background of the continuing hryvnia devaluation, but also in U.S. dollar and package pieces. We have found that in 2016 the sales growth in the retail segment of Ukrainian pharmaceutical market in hryvnia was 22.0%, in U.S. dollar – only 4.0%, and in package pieces – 6.0%. The positive trend of sales volume growth had its development also in 2017. For example, pharmacy sales increased, in comparison with 2016 data, by 22.0%, in U.S. dollar – by 17.0%, and in natural indexes – only by 5.0%. It has to be

noted that in 2017 relative stabilization of exchange rate of the national currency against the U.S. dollar was observed. For example, average weighted exchange rate of hryvnia, calculated on the basis of monthly indexes of interbank foreign exchange market in 2016 was 2538.91 hryvnias, and in 2017 – 2655.06 hryvnias for 100 U.S. dollars¹⁶. Therefore, the growth of the national currency exchange rate was only 4.6%. It was incommensurable with analogous indexes for 2014, 2015, and 2016. For example, growth of the national currency exchange rate in 2014, in comparison with 2013, was equal to 47.7%; in 2015 – 81.6%, and in 2016 – 17.8%. In 2014, 2015 and 2016 particularly the highest growth of weighted average cost of one sale realized in the retail segment of Ukrainian pharmaceutical market was observed.

Figure 1 gives change dynamics for weighted average cost of one sale realized in pharmacies during 2010-2017. For example, in 2014 this index, relatively to 2013, grew by 28.0%, in 2015 – by 41.0%, and in 2016 – by 16.0%. In general, it should be noted that weighted average cost of one sale during 2011-2017 was characterized with continuous growth, the same as the retail segment of the market in hryvnia in general. That said, from year to year different value of growth rate of this index was observed. The highest growth rates (41.0%) of weighted average cost of one product package realized in pharmacies were observed in 2015, and the lowest – in 2017 (10.0%).

The next direction of our research was dynamics analysis for sales volume per capita, expressed in the national currency and U.S. dollar. Sales volume of products in the retail segment of the market per capita, expressed in the national currency, during 2011-2017 fluctuated in the range from 593.59 (2011) to 1720.89 hryvnias (2017), and in U.S. dollars – from 40.70 (2011) to 44.09 U.S. dollars (2017) (Figures 2 and 3). In 2017, in comparison with 2011 data, the sales volume of products in the retail segment of the market per capita increased, in hryvnia, by a factor of 2.9 (1720 hryvnias against 593.59 hryvnias, correspondingly), and in U.S. dollar – by a factor of only 1.08 (44.09 dollars against 4.70 dollars, correspondingly). From 2011 to 2013 growth of pharmacy sales indexes per capita, when expressed both in hryvnia and U.S. dollar, was observed.

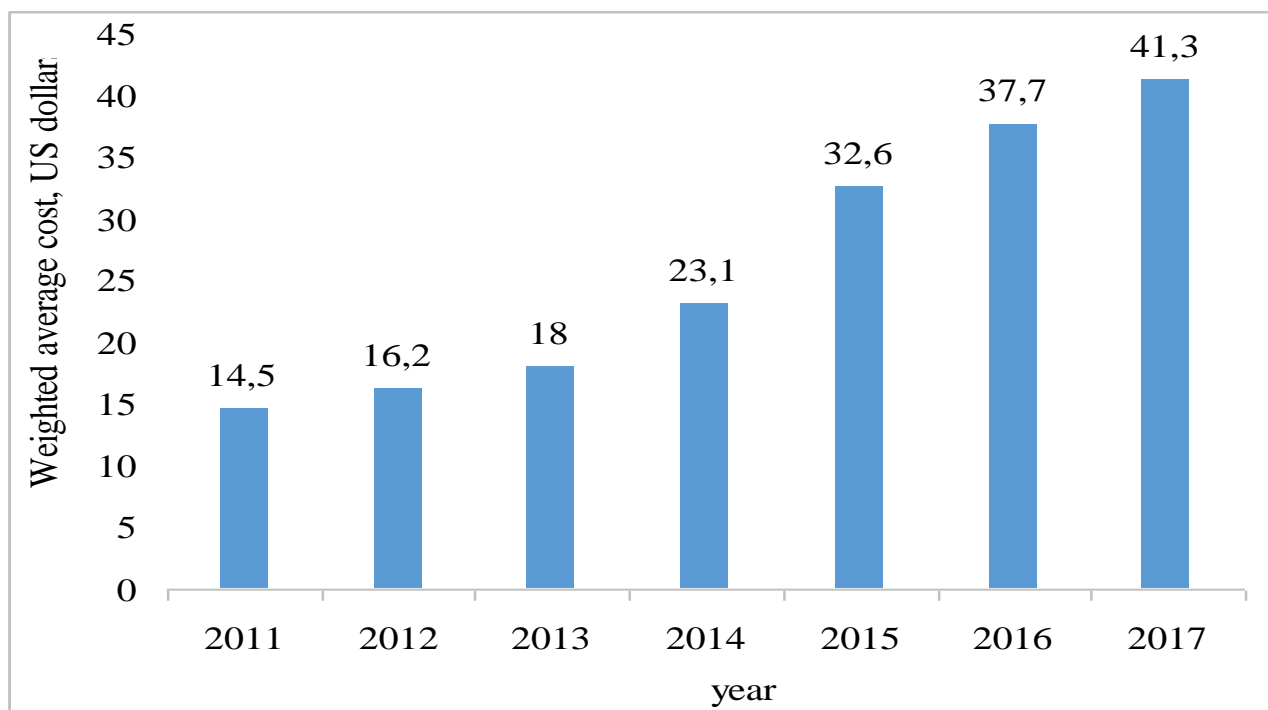


Figure 1: Change dynamics analysis of weighted average cost of one pharmacy sale

In 2014 the specified indicators decreased. Moreover, the greatest decrease was characteristic of the data that was expressed in U.S. dollar (–11.0%). According to 2015 data, on the background of rampant hryvnia devaluation growth of indexes of pharmacy sales volume per capita expressed in the national currency was observed. Furthermore, the retail market segment in general demonstrated growth by 38.0% and sales per capita – by 46.0%. Significant

growth of retail sales per capita in 2015 is due to population decrease by 5.0%. In 2015 particularly the greatest decrease of population in Ukraine was observed [25, 26]. Moreover, in 2015 the lowest index of sales volume per capita in U.S. dollar (36.04 U.S. dollars) was observed. Beginning in 2016 a gradual growth of indexes of sales volumes per capita, expressed in U.S. dollar, is observed (from 37.24 U.S. dollars in 2016 to 44.09 U.S. dollars in 2017).

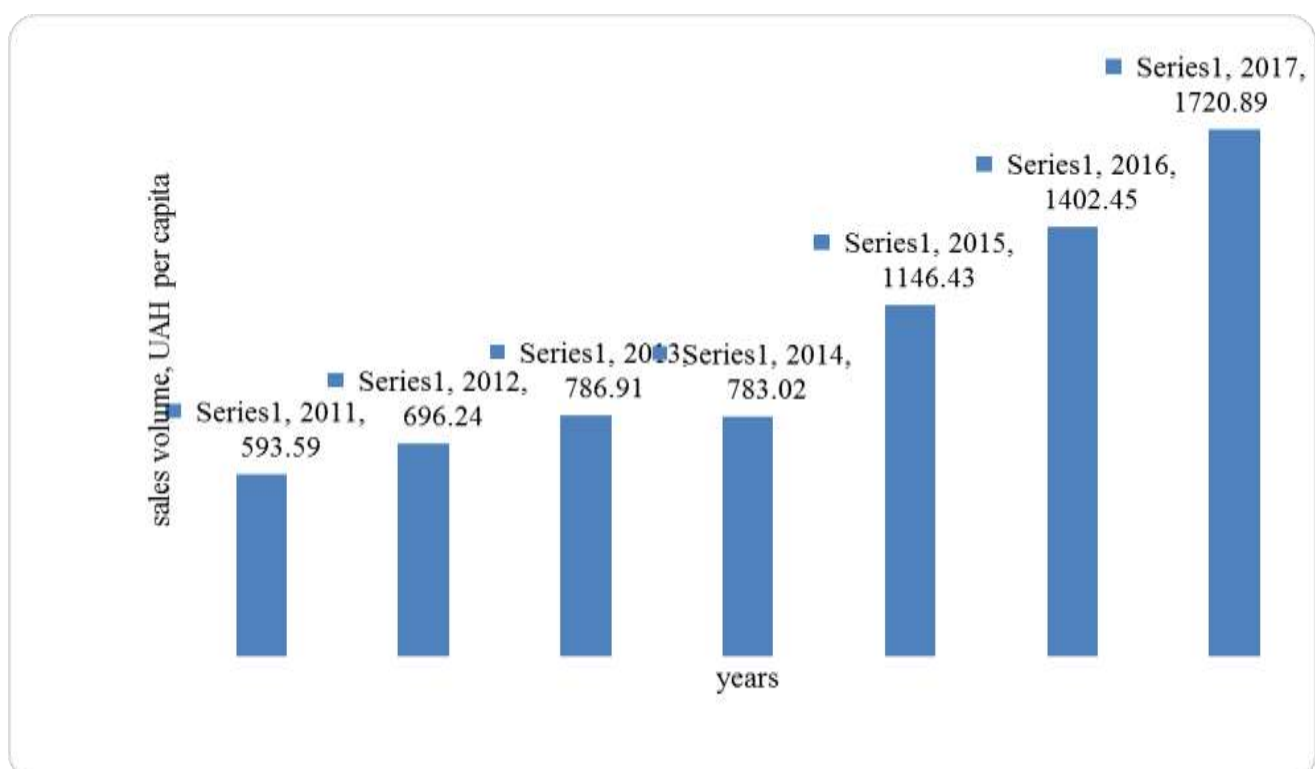


Figure 2: Change dynamics analysis of pharmacy sales per capita in Ukraine (hryvnia/capita)

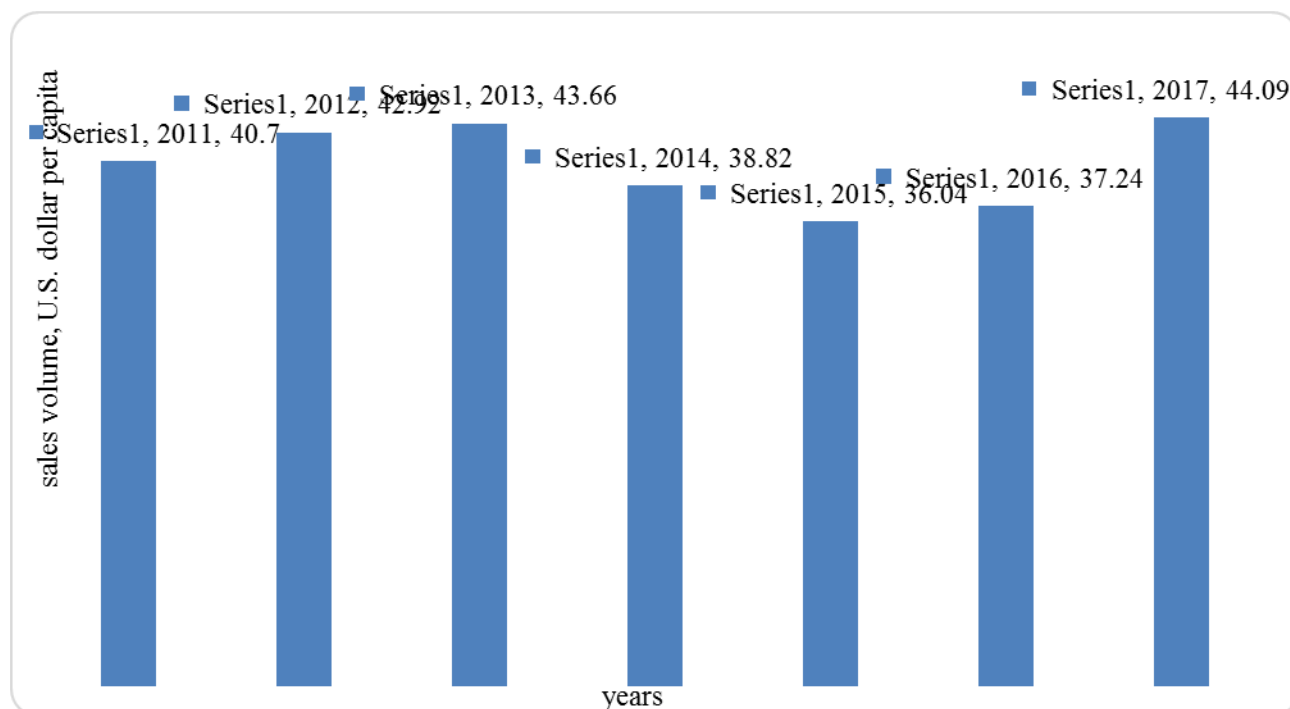


Figure 3: Change dynamics analysis of pharmacy sales per capita in Ukraine (U.S. dollar/capita)

Discussion

Retail segment of Ukrainian pharmaceutical market in 2011-2017 was characterized by complex nature of its development, when expressed in hryvnia, U.S. dollar and in natural indexes (package pieces). Devaluation of the national currency, observed from 2014 on the background of political and social-economic crisis in the country, has greatly affected the change dynamics of pharmacy sales in Ukraine. During 2011-2017 index of sales volume in pharmacies had zigzag-shaped development dynamics when expressed in the national currency, U.S. dollar and in natural indexes alike. We can distinguish several stages of retail segment of Ukrainian pharmaceutical market development; they are characterized by different development dynamics. The first stage lasted from 2011 to 2013, and was characterized by positive growth dynamics of pharmacy sales, when expressed in any of the units used in the studies (hryvnia, U.S. dollar, and package pieces). The second, the most difficult, period lasted for two years (2014-2015). The third period began in 2016. Let's discuss the characteristics of these development stages of the national pharmacy sales market, which we distinguished, in rather more detail. During 2011-2013 stable growth of sales volume indexes, expressed in hryvnia, U.S. dollar, and natural indexes, was observed on the market. In addition, the rates of sales volume growth, expressed in hryvnia and U.S. dollar alike, fluctuated in a

narrow range of values. The pharmacy sales growth rates had lower values of sales growth rates (5.0% in 2012 and 2.0% in 2013). 2014 became a watershed year for development of the whole Ukrainian society in general, and of the retail segment of the pharmaceutical market in particular. It was during that year when the main tendencies were formed, which later affected the development of the Ukrainian pharmaceutical market up to 2017. During 2014 decrease of pharmacy sales volume, when expressed in the national currency, U.S. dollar, and in natural indexes alike, was observed. At the same time, throughout the whole period researched, 2014 was characterized by the highest decrease rates of sales volumes, when expressed in U.S. dollar (-32.0% in comparison with the previous year, 2013). During the next, 2015 year, further decrease of sales volumes on the retail segment of market in U.S. dollar (22.75 mln.U.S. dollars against 34.05mln. U.S. dollars in 2011) and in natural indexes (1507.1 mln. packages against 1875.6 mln. packages, according to 2011 data) was observed. Moreover, in 2015 the lowest index value of pharmacy sales volume per capita in U.S. dollar (36.04 U.S. dollars) was observed. If we use descriptive terms, we can say that in 2015 the retail segment of Ukrainian pharmaceutical market, expressed by us in U.S. dollar and in pieces of packages sold, hit the bottom. Significant increase of sales

volume, expressed in national currency, observed in 2015 (indexes growth by 38.0% in comparison with the previous year, 2014), was due to the significant influence of devaluation processes observed on the financial market of the country. The results of research of pharmacy sales dynamic from 2016 allowed us to look to the future with slight optimism. For example, in 2016 the positive nature of the product sales development dynamics in the retail market segment emerged, when expressed in hryvnia, dollar, and natural indexes alike. We should point out the following fact: on the background of relative U.S. dollar exchange rate stability that was observed in 2017 the growth of sales volume expressed in U.S. dollar was 17.0%, and in natural indexes – 5.0%. Gradual decreasing of growth rate of one sale average weighted cost that was observed from 2016 seems to be another important positive trend. For example, in 2015 the maximum growth rate value of the above mentioned index was observed (41.0%). As early as 2016 the growth rate of average weighted one sale cost was equal to 16.0%, and in 2017 – 10.0%. In the conditions of decreasing spending power of Ukrainian population, and of lack of effective mechanisms of drug reimbursement, this trend is of significant social-economic importance. The fact that increase of sales volume per capita, expressed in U.S. dollar, was observed in Ukraine beginning in 2016 – from 37.24 to 44.09 U.S. dollars in 2017, – also is important. But it's important to note that the research in this direction has to be continued. Such research has to be conducted in the direction of evaluation of impact degree of demographic indexes change on the development dynamics of the pharmaceutical market in general and its retail segment in particular.

Conclusion

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The retail segment of Ukrainian pharmaceutical market is its complex constituent. Many factors of internal and external nature influence its development. This fact, once again, underlines the relevance of development and implementation of effective mechanisms of government control of Ukrainian pharmaceutical market in general, and of consumption of drugs and of products from pharmaceutical assortment in particular. In the conditions of political and social-economic crisis, which began in the country in 2014, Ukrainian consumers of pharmaceutical services should not be left alone to face the problem of significant increase of medical product prices. Unfortunately, the state began to adopt drug reimbursement programs only starting from 2016 [28, 29, 30]. These programs cover a limited contingent of patients, and cannot solve the problem of low social-economic availability of medical products for the considerable part of the country population. The way out of this situation is implementation of systemic reforms in health protection, and development of consistent state policy of Ukrainian pharmaceutical market development and medicines' consumption regulation.

Acknowledgments

The authors would like to thank all participants for their contribution to this study

Conflict of Interest

The authors declare that they have no conflict of interest to disclose.

Contributing Authors

The research was conducted by the authors without financial support from any organizations or funds.

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