

**About the standards of development and the placement of pharmacy network in the Republic of Kazakhstan**

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**Abstract:** This article presents the results of a retrospective and comparative analysis of the development of a retail pharmacy organization. On the basis of a current state of the organization of provision of medicines of the population in the conditions of market economy, taking into account the main tendencies of development of the pharmaceutical market need of development of standards of development and placement pharmaceutical establishments in the Republic of Kazakhstan is revealed. Major factors developments of pharmacy network, most influencing standard indicators are revealed. As a result of the step-by-step analysis the equations of the regression which have entered then into model on an indicator "Number of inhabitants on one pharmacy" in city and separately rural areas are received.

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**1. Introduction**

Main objective of social policy of the Republic of Kazakhstan - consecutive increase of level and quality of life of the population, providing the main social guarantees, including the available and qualitative medical and medicinal care. One of components of availability of the medicinal help to the population - existence of rather developed network of the pharmaceutical organizations, and their efficient placement.

Since the 1990th there have been big changes in pharmaceutical service of Kazakhstan in connection with transition to work in the conditions of the market relations. Introduction of new forms of ownership caused rapid growth of pharmaceutical institutions in the city district, and at the same time the medicinal help was inaccessible to many villagers.

It is possible to say that opening of points of sale of drugs has to be favorable both to the businessman, and to the state. But at the same time it is necessary to satisfy the inquiries of the population.

Development of pharmacy network in rural areas, especially in certain peripheral areas now is very unprofitable to the businessman. As a result patients are compelled to get medicine in the regional centers or even in the next cities. At the same time it ripens the conflict between the patient and the state. Each citizen of Kazakhstan has the right to demand observance of its constitutional rights on health protection that requires formation of a reasonable state policy guaranteeing a level of quality of the medicinal help adequate to requirements [1].

The analysis of pharmacy placement in the city district shows that the pharmaceutical organizations are created spontaneously, without actual needs of inhabitants – the places of the greatest population congestion (the markets and/or supermarkets). As a result it is quite often possible to observe a picture when on quite limited space there are several pharmacies, though regions of Kazakhstan do not differ in a high standard of living of the population and the developed social infrastructure adjoins.

Authorized bodies in the health care sphere on licensing the pharmaceutical practice connect such situation by absence of network placement standards of the pharmaceutical arrangement, and also any spatial restrictions at their creation. It is obvious that the existence of such number of the organizations in the pharmaceutical market is economically inexpedient as it generates the unjustified competition and decrease in their profitability [2].

Data of references, departmental information, and also materials of sociological poll of pharmaceutical workers testify that rapid growth of development of the pharmaceutical organizations in the city district is one of the factors promoting:

- increase in specific weight of the forged goods to expansion of the shadow market;
- violation of requirements of a pharmaceutical order by subjects of the pharmaceutical market;
- arrival to branch of nonprofessionals, etc [3].

In our republic the development and pharmaceutical organizations network placement has

not been regulated by the state for more than 10 years, and the problem of efficient pharmacy network placement in urban and rural areas is still sharp.

## 2. Material and Methods

The basic principles of development and pharmacy placement were stated for the first time in order No. 705, MH USSR, July 27, 1978 "About the standards of development and the principles of pharmacy placement". According to requirements of this order development and the territorial organization of pharmacy network was to provide:

- full and timely satisfaction of requirement of the population in medicines and subjects of medical appointment;
- increase of level of the organization of the medicinal service providing optimum conveniences to the population;
- quantitative growth of establishments of pharmacy network according to growth of requirements of the population and the treatment-and-prophylactic establishments (TPE) in medicines and other subjects of medical appointment;
- rapprochement of levels of provision of medicines in urban and rural settlements;
- efficient integration of pharmacies within the admissible radius of service;
- improvement of existing and application of more progressive medicinal service forms for the population.

This order regulated the radius of service of pharmacies which should not have exceeded the radius of service of polyclinic in cities, i.e. 1,5-2 km at the foot message, in large cities the service radius made to 0,5 km.

In rural areas the service radius of pharmacies should not have exceeded 5-10 km at average population density of 50-70 inhabitants on 1 sq.km [4].

The satisfaction of requirement of the population in medicines products of medical appointment and improvement of material base of pharmaceutical institutions was the main objective of planned system of managing pharmaceutical service.

However, in modern conditions of development of the Kazakhstan pharmaceutical market these problems are solved. The competition law dominates in the pharmaceutical market. The number of pharmaceutical organizations has sharply increased, while the quantity of production drugstores considerably decreased. Therefore requirements of this order do not correspond to modern operating conditions of pharmacy network.

Similar problems exist and in other CIS countries. The condition of pharmaceutical sector

depends now on the market relations and has unregulated character. It dictates the need of development of integrative approach and elaboration of ensuring availability of medicines strategy to the population, proportional to economic potential. The specified task is feasible at the organization of efficient, functional and flexible and adjustable system of the pharmaceutical organizations. [5].

Even in pre-revolutionary Russia the following principles were created for the pharmaceutical organizations development according to the sources:

- providing reasonably sufficient profit for pharmacy-owners;
- satisfactory ensuring needs of increasing population with medicines.

The quantity of pharmacy in cities was limited to number of the permanent residents who were within the city and numbers of recipes annually arriving in pharmacy and their repetitions. The distance of one pharmacy from another was not stipulated, and at a choice of a place of opening in the city of a new drugstore it was necessary to be guided by "the convenience of public and elimination of pharmacy mutual choice". Convenience of public was understood as uniform placement of pharmacies as in more densely populated and less densely populated areas. The principle of pharmacy placement in rural areas and settlements did not consider neither numbers of inhabitants, nor recipes arriving in pharmacies, except the distance between them. As a result, in pre-revolutionary Russia unregulated competitive fight turned back an extreme arbitrariness of all pharmaceutical business [6].

Now in market conditions there are similar phenomena: the number of the inhabitants falling on one pharmacy is not regulated, and the distance between them is not considered. Negative consequences were: the advancing growth of the small retail organizations development, considerable reduction of production pharmacies.

Research of foreign sources of literature showed that in many foreign countries there is no planned pharmacy network development, though in France, Greece, Luxembourg, etc. the number of pharmacies is regulated by the law [7].

The principles of pharmacy placement in foreign countries are various and connected with the developed system existing in each country.

The basic principles of pharmacy placement abroad are: receiving profit by means of pharmacies for what such factors as the number of the population, its income and the consumer ability, competing objects are considered [7].

Transformations in pharmaceutical sector of Kazakhstan were radical, than in other new

independent states of the former union. Introduction of free pricing, liquidation of the state monopoly of foreign trade, mass privatization of pharmacy network and privatization of manufacturing enterprises through privatization and incorporating became essence of these transformations. Results of these reforms were development of local pharmaceutical production, prompt growth of the wholesale enterprises number and the expansion of the private sector in pharmaceutical business [8]. For the purpose of regulation of a turn of medicines, in the country the standard and legal base is created. Decrees of the President of RK valid the law "About Medicines", the law "About Health Protection of the RK People" in which some principles of the organization of the medical and medicinal care stated to the population of the Republic of Kazakhstan became the first achievements of pharmaceutical sector.

On the basis of pharmacy placement studying and the small retail of pharmaceutical organizations in Kazakhstan, taking into account features of the modern period of social and economic conditions developed the principles of placement of the pharmaceutical organizations. The basic principles are:

- ensuring physical and economic availability to the fixed vital medicines;
- ensuring quality, safety and efficiency of medicines;
- rapprochement of level of provision of medicines in urban and rural areas;
- providing with medicines within the guaranteed volume of free medical care;
- ensuring profitability of pharmacies.

For planning of placement of again opened pharmacies it is offered to consider the following factors:

- number and population density.
- security of the territory with retail pharmacy network.
- security with treatment-and-prophylactic establishments and level of rendering of medical care to the population.
- social and economic characteristics of the population etc.

### 3. Results

The analysis of these references on the conducted researches about development and placement of pharmacy network shows that the main indicators are "number of inhabitants for one drugstore" and "number of pharmaceutical positions" [4].

Forecasting the development of pharmaceutical institutions network should be carried out proceeding from availability of the medicinal help

taking into account economic indicators of pharmacy work carrying out marketing research [9]. However, in the conditions of market economy many economic indicators of trade institutions work to which pharmacies also belong to have a trade secret character. Therefore to collect data on commodity turnovers, profits, suppliers in pharmacy network remained difficult. We obtained only data on volumes of retails on group "pharmaceutical goods" from the materials management statistically on the scale of areas without division into urban or rural areas. Therefore besides economic factors some other improving standards of development of pharmacy network placement were used.

At the first stage we chose objects of research which were the pharmaceutical organizations serving the population.

The main indicators in a section of all areas (15 areas) Kazakhstan - Almaty, Astana in dynamics for 2005-2011 years.

Investigations were conducted on the following parameters:

1.The population of RK in whole and separately by regions

2.The gender and age structure of the population

3.The density of population

4 The migration of population

5.Sickness rate

6 .The number of medical institutions

7.The number of out-patient and polyclinic visits

8.The number of recipes

9. The number of doctors

10.The number of retail pharmaceutical institutions (drugstore, pharmaceutical points, pharmaceutical booths)

11 .Quantity of wholesale warehouses

12 .Pharmaceutical specialists

13.Commodity turnover for the group Pharmaceutical Goods

14.Population incomes

15.The size of the nominal salary per employee

16 .Consumption of drugs per capita

Then selection of factors having the greatest impact on development of a network of pharmaceutical institutions was made.

As initial information agency data according to the Republic of Kazakhstan, annual collections "Health of the Population of the Republic of Kazakhstan and Activity of the Organizations of Health Care", reporting data of Management of Pharmaceutical control on quantity of objects of pharmaceutical activity for the studied period and other statistical materials were used.

After preliminary processing of available data we found the statistics allowing more authentically

estimating standard indicators and containing more than information.

At the following stage we studied stability of mutual influence of factors. Researches were conducted by means of mathematic-statistical methods and computer technologies.

When developing models for definition of the standard of development and placement of drugstores it was received a number of the models on the one hand rather well describing studied statistics. However, on the other hand at selection of the most significant factors having essential impact on development of pharmacy network, their approbation was required to use those from them which would be taken in a basis for calculations of standards of optimum load of one pharmacy.

On the basis of the received models we calculated expected indicators of development of pharmacies in administrative territories taking into account expected values of factors.

Determination of dependence of average size of one sign from change of another also is the most important problem of statistical measurement of communication. This dependence is called correlation.

The essence of the correlation and regression analysis consists that the corresponding mathematics-statistical receptions for identification reasonably - investigative communications in interaction of all set of factors (main and minor) on studied process are used. The correlation analysis in researches is used with the purpose to measure narrowness of communications of two and more indicators to select the factors having the greatest impact on a required indicator, the defining standard of development of pharmaceutical institutions and to find unknown causal relationships. The regression analysis allows to establish a form of dependence and to define regression function. Both of these types of the analysis are closely connected among themselves and are more often carried out at the same time [10].

Economic problem of our research was definition of optimum load of one pharmacy serving the population which moves forward as a standard indicator at development of a network of pharmaceutical institutions. Therefore we considered the factors having close connection with these .

Studied factors were subjected to an assessment by means of mathematics-statistical methods of the analysis. For the best informational content at definition of optimum load of one drugstore synthetic indicators bearing in themselves, both information formed of simple indicators, and new complex information were calculated. So, as synthetic indicators we took the number of inhabitants, number of pharmacies on 10000 population, number of doctors on 10000 population, population shift,

population density and others. However many of these indicators were ineffective and were removed by us from calculations.

We used well complex factors in initial models: realization of pharmaceutical goods on one inhabitant, number of pharmaceutical experts on 10000 inhabitants, number of out-patient and polyclinic visits, number of treatment-and-prophylactic and out patient and polyclinic establishments and number of doctors on 10000 population.

It is known that mathematics-statistical methods give big effect when using uniform populations of elements having mass character, stability of indicators of a variation and interrelation of various elements [4]. Indicators of activity of pharmaceutical institutions and health care don't possess such uniformity therefore originally we made group of the taken indicators. And then, for carrying out the qualitative mathematical analysis from big set of statistical data factors which were used further for creation of models were specially selected and calculated (Table 1, 2, 3, 4, 5).

For calculations of standards of development and placement of pharmacy network we investigated and selected the following factors:

- $X_1$ -incidence on 10000 populations;
- $X_2$  - number of doctors on 10000 populations;
- $X_3$  - a nominal average salary on 1 worker;
- $X_4$  – the Volume of realization of pharmaceutical goods.

Development of models for calculation of standard indicators was carried out with application of the step correlation and regression analysis according to specially developed program. In the program consistently included new and new factors. Calculation of coefficients of regression was carried out by a method of the smallest squares (Table 6, 7, 8, 9, 10, 11, 12, 13, 14, 15).

As a result of the carried-out analysis we received some equations of regression from which the equation which has the highest rate of coefficient of correlation and social and economic interpretation of settlement indicators is chosen:

Region: Republic of Kazakhstan

Received functions:

$$1. Y = 1.13 X_1 + (15.25);$$

where:

$X_1$  - incidence on 10000 population;

Coefficient of correlation of  $R=0.99$ .

Arithmetic average on an indicator: "Number of the inhabitants falling on one pharmacy" – 6463.

$$2. Y = 0.88 X_1 + (41.55) X_2 + (14.63);$$

where:

$X_1$  - incidence on 10000 population;

$X_2$  - number of doctors;

Coefficient of correlation of  $R=0.99$ .

Table 1. Number of inhabitants considering on one drugstore.

№	Year	2005	2006	2007	2008	2009	2010	2011
1	The Republic of Kazakhstan	6951	6779	6553	6401	6319	6241	6136
2	In the city	5907	5750	5662	5452	5358	5267	5188
3	In the country	6031	5849	5761	5676	5567	5488	5356

Table 2. Incidence of the population (counting on 10000 population).

№	Year	2005	2006	2007	2008	2009	2010	2011
1	The Republic of Kazakhstan	5205,4	5751,8	5641,4	5733,5	5907,3	5911,0	5876,9
2	In the city	6705,4	6789,4	6858,7	6855,2	6824,1	6807,9	6785,6
3	In the country	4346,5	4400,5	4049,6	4254,7	4403,1	4477,0	4424,5

Table 3. The number of doctors (on 10000 population).

№	Year	2005	2006	2007	2008	2009	2010	2011
1	The Republic of Kazakhstan	34,6	36,1	30,2	30,6	36,5	36,7	36,9
2	In the city	53,0	53,1	53,1	54,0	54,3	54,6	54,8
3	In the country	12,3	12,5	13,0	12,8	12,4	12,7	12,8

Table 4. Nominal average salary on 1 worker.

№	Year	2005	2006	2007	2008	2009	2010	2011
1	The Republic of Kazakhstan	17303	20323	23128	28329	33456	38514	43612
2	In the city	17303	20323	23128	28329	33467	38512	43723
3	In the country	12112	14226	19330	23677	27721	30524	34245

Table 5. Volume of realization of pharmaceutical goods.

№	Year	2005	2006	2007	2008	2009	2010	2011
1	The Republic of Kazakhstan	11811	13964	17360	20832	24198	27321	29587

Table 6. The calculated number of inhabitants per one pharmacy depending on morbidity.

year	2005	2006	2007	2008	2009	2010	2011
deviation	15	4	3	-1	-6	-7	-8
Number of inhabitants	5885	6501	6376	6486	6676	6680	6642

Table 7. The calculated number of inhabitants per one pharmacy depending on morbidity, the number of doctors.

year	2005	2006	2007	2008	2009	2010	2011
deviation	13	3	5	1	-6	-8	-9
Number of inhabitants	6017	6559	6217	6314	6712	6723	6702

Arithmetic average on an indicator:  
 "Number of the inhabitants falling on one pharmacy"  
 - 6463  
 $3. Y = 0.85 X_1 + (39.14)X_2 + (0.01) X_3 + (16.07);$   
 where:

$X_1$  - incidence on 10000 populations;  
 $X_2$  - number of doctors;  
 $X_3$  - nominal average wage payment on one worker;  
 Coefficient of correlation of  $R = 0.99$ .

Table 8. The calculated number of inhabitants per one pharmacy depending on morbidity, the number of doctors, the population income.

year	2005	2006	2007	2008	2009	2010	2011
deviation	15	4	6	1	-7	-9	-11
Number of inhabitants	5935	6483	6180	6314	6733	6784	6802

Arithmetic average on an indicator:  
 "Number of the inhabitants falling on one pharmacy"  
 - 6462

$4. Y = 0,55X_1 + (69.07) X_2 + (0.02) X_3 + (0.02) X_4 + (16.85);$   
 $X_1$  - incidence on 10000 populations;  
 $X_2$  - number of doctors;

$X_3$  – nominal environments. Salary on one worker;  
 $X_4$  – realization volume pharm. Goods;

Correlation coefficient to  $R = 0.99$ .

Table 9. The calculated number of inhabitants per one pharmacy depending on morbidity, the number of doctors, the population income, the volume of pharmaceutical goods' sell.

year	2005	2006	2007	2008	2009	2010	2011
deviation	15	5	7	1	-12	-6	-10
Number of inhabitants	5911	6428	6096	6362	7068	6628	6731

Arithmetic average on an indicator: "Number of the inhabitants falling on one pharmacy" on the scale of areas of Kazakhstan made-6461.

For definition of the standard of development of pharmacies in the city district the function "U1", "number of inhabitants on 1 city drugstore" was used.

The developed system of factors included the following indicators:

$X_1$  - incidence of the population on 10000 populations;

$X_2$  - number of doctors;

$X_3$  - nominal average salary on 1 worker;

$X_4$  - commodity turnover of drugstores.

On the basis of creation of several intermediate equations in which the most essential factors influencing the end result of research are included, we received some equations of regression.

Thus in each equation included on one significant factor, and then it was added on one all other factors.

At the following stage of action the importance of each again entered factor was estimated. Thus correlation coefficients paid off. It is known that the closer value of coefficient to unit, the closer communication between two indicators is.

As a result, we chose the equation having higher statistical estimates, taking into account economic and social characteristics of activity of pharmaceutical institutions in the city district.

$$1. Y_1 = 0.81X + (0.80);$$

where:

$Y_1$  – number of inhabitants having on one city pharmacy;

$X$  – incidence on 10000 population;

Coefficient of correlation of  $R=0,99$

Table 10. The calculated number of inhabitants per one pharmacy depending on morbidity.

year	2005	2006	2007	2008	2009	2010	2011
deviation	8	5	2	-2	-3	-5	-6
Number of inhabitants	5435	5503	5559	5556	5531	5518	5500

Arithmetic average on an indicator "number of inhabitants on one drugstore" - 5515

$$2. Y_1 = 2.70X_1 + (-238.5) X_2 + (1.09);$$

$X_1$  – incidence on 10000 populations;

$X_2$  – number of doctors;

Coefficient of correlation of  $R=0,99$

Table 11. The calculated number of inhabitants per one pharmacy depending on morbidity, the number of doctors.

year	2005	2006	2007	2008	2009	2010	2011
deviation	8	2	-3	-3	-2	-1	-1
Number of inhabitants	5450	5653	5840	5616	5460	5345	5237

Arithmetic average on an indicator number of inhabitants on one pharmacy" 5514.

$$3. Y_1 = 7.36X_1 + (-860.2) X_2 + (0.06) X_3 + (2.53);$$

where:

$X_1$  – incidence on 10000 population;

$X_2$  – number of doctors;

$X_3$  – a nominal average salary on 1 worker;

Correlation coefficient –  $R=0,99$ .

Table 12. The calculated number of inhabitants per one pharmacy depending on morbidity, the number of doctors, nominal average salary of 1 employee

year	2005	2006	2007	2008	2009	2010	2011
deviation	19	5	-9	-5	-3	-3	-5
Number of inhabitants	4796	5510	6188	5700	5522	5448	5424

Arithmetic average on an indicator – "number of inhabitants on one pharmacy" 5513 in the city district.

Calculation of pharmacies development standard in rural areas

For calculation of the standard of development of pharmacy network in rural areas the «Y<sub>2</sub>» function - "number of inhabitants on one rural drugstore" is used.

We used the following indicators:

X<sub>1</sub>-incidence on 10000 populations;

X<sub>2</sub> – number of doctors;

X<sub>3</sub> - a nominal average salary;

X<sub>4</sub> – pharmaceutical shots/

For obtaining standards of development of rural pharmacy network social and pharmaceutical aspects of activity of pharmaceutical institutions are used.

The system of the equations of a step-by-step method of the regression analysis consisted of the following values of the «Y<sub>2</sub>» functions:

$$1. Y_2 = 1.31X + (6.02);$$

where:

X<sub>1</sub> – incidence on 10000 country people;

Coefficient of correlation of R=0,99.

Table 13. The calculated number of inhabitants per one pharmacy depending on morbidity.

year	2005	2006	2007	2008	2009	2010	2011
deviation	6	2	8	2	-3	-7	-8
Number of inhabitants	5680	5751	5293	5560	5754	5851	5782

Arithmetic average on an indicator – "number of inhabitants on one pharmacy" – 5667

$$2. Y_2 = 0.37X_1 + (322.92) X_2 + (2.0);$$

where:

X<sub>1</sub>-incidence on 10000;

X<sub>2</sub> – number of doctors;

Coefficient of correlation of R = 0,99.

Table 14. The calculated number of inhabitants per one pharmacy depending on morbidity, the number of doctors.

year	2005	2006	2007	2008	2009	2010	2011
diversion	8	3	1	0	-1	-5	-7
Number of inhabitants	5565	5650	5683	5693	5618	5742	5755

Arithmetic average on an indicator "number of inhabitants on one pharmacy" – 5672

$$4. Y_2 = 0.34X_1 + (323.69) X_2 + (0.0) X_3 + (2.20);$$

where:

X<sub>1</sub> – incidence on 10000 population;

X<sub>2</sub> – number of doctors;

H3-a nominal average salary on 1 worker;

Coefficient of correlation of R=0,99.

Table 15. The calculated number of inhabitants per one pharmacy depending on morbidity, the number of doctors, nominal average salary per 1 employee.

year	2005	2006	2007	2008	2009	2010	2011
diversion	8	4	2	0	-1	-5	-8
Number of inhabitants	5519	5611	5674	5697	5635	5769	5799

Arithmetic average on an indicator – 5672.

At introduction in system of an indicator of X<sub>4</sub> – "pharmaceutical shots" the correlation coefficient between factors was equal to zero that points to lack of dependence between these variables – a multicollinearity complicating carrying out the analysis. Therefore this indicator was removed from the program of calculations. And for calculation of a standard indicator the last equation was chosen.

The arithmetic average on indicators - 5672 inhabitants is the share of one rural drugstore, as a whole on the region Kazakhstan.

From the point of view of the steady and stable growth of welfare of the population, the branch

of the health care, representing uniform, developed, socially focused system, urged to provide availability, timeliness, quality and continuity of rendering medical care, is one of the main priorities in the Republic. Therefore, improvement of quality of medical services and development of hi-tech health system has to become the main direction of a state policy at a new stage of development of our country [11]. One of target problems of health care is rapprochement of level of the medical and medicinal care to the population in the city and rural areas. The program of strategic development of health care, including the rural areas is made for this purpose. The program of development of health care in the

coming years provided the construction of 100 hospitals in the regions, the further development and improvement of the health care system in rural areas, including further increasing of the motivation of the village health workers (housing, payment of lump-sum grants), the formation of mobile medical teams for rural remote areas. States shall take all possible measures to improve the health in rural regions. The

data which we received as a result of research development indicators pharmacy services in Kazakhstan as well suggest the convergence level pharmaceutical care in rural and urban areas.

Data on development and placement of pharmacy network in the urban and rural areas by regions of RK are presented in tables 16, 17.

Table 16. The standards of pharmacy network development in the city districts in the regions of Kazakhstan

№	The regions of Kazakhstan	Function equation	The standard the «number of inhabitants per 1 city pharmacy »
1.	The Republic of Kazakhstan	$Y=7,36X_1+(-860,2)X_2+(0,06)X_3+(2,53)$	5513
2.	The region of Akmola	$Y=0,79X_1+(-0,10)X_2+(0,00)X_3+(27,58)$	5364
3.	The region of Aktobe	$Y=-0,70X_1+(181,62)X_2+(-0,08)X_3+(3,71)$	4705
4.	The region of Almaty	$Y=-0,74X_1+(235,71)X_2+(0,05)X_3+(3,87)$	6478
5.	The region of Atyray	$Y=0,62X_1+(60,48)X_2+(-0,0)X_3+(-0,03)$	4687
6.	The region of East Kazakhstan	$Y=-11,58X_1+(2111,3)X_2+(-0,34)X_3+(-7,56)$	5324
7.	The region of Zhambyl	$Y=-6,32X_1+(798,16)X_2+(0,40)X_3+(12,65)$	6470
8.	The region of West Kazakhstan	$Y=-2,28X_1+(381,98)X_2+(-0,06)X_3+(2,36)$	5958
9.	The region of Karaganda	$Y=-74,76X_1+(9606,6)X_2+(-0,93)X_3+(-2,88)$	4874
10.	The region of Kostanay	$Y=1,04X_1+(-16,79)X_2+(-0,00)X_3+(-1,76)$	5520
11.	The region of Mangystau	$Y=1,50X_1+(-190,6)X_2+(-0,01)X_3+(-1,46)$	4753
12.	The region of Kyzylorda	$Y=0,88X_1+(-42,24)X_2+(0,00)X_3+(0,05)$	4756
13.	The region of South Kazakhstan	$Y=6,01X_1+(-642,5)X_2+(0,19)X_3+(-0,82)$	6636
14.	The region of Pavlodar	$Y=-1,53X_1+(173,19)X_2+(0,20)X_3+(-0,66)$	5512
15.	The region of North Kazakhstan	$Y=0,03X_1+(161,44)X_2+(-0,07)X_3+(1,05)$	6635
16.	The city of Astana	$Y=-0,48X_1+(126,42)X_2+(0,04)X_3+(0,62)X_4+(80,89)$	6679
17.	The city of Almaty	$Y=0,20X_1+(83,77)X_2+(-0,05)X_3+(0,34)X_4+(7,89)$	7127

Table 17. The standard of development of pharmacy network in rural districts in regions of Kazakhstan

№	The regions of Kazakhstan	Function equation	The standard the «number of inhabitants per 1 in rural areas »
1.	The Republic of Kazakhstan	$Y=0,34X_1+(323,69)X_2+(0,00)X_3+(2,20)$	5672
2.	The region of Akmola	$Y=0,42X_1+(419,26)X_2+(-0,01)X_3+(2,58)$	5499
3.	The region of Aktobe	$Y=6,10X_1+(-1411)X_2+(0,14)X_3+(19,02)$	5532
4.	The region of Almaty	$Y=-0,54X_1+(1577,6)X_2+(-0,24)X_3+(-22,67)$	7166
5.	The region of Atyray	$Y=0,37X_1+(178,23)X_2+(0,05)X_3+(12,08)$	5693
6.	The region of East Kazakhstan	$Y=1,37X_1+(-90,15)X_2+(0,01)X_3+(3,13)$	6355
7.	The region of Zhambyl	$Y=-23,83X_1+(5891,7)X_2+(1,21)X_3+(-16,44)$	6875
8.	The region of West Kazakhstan	$Y=0,90X_1+(69,67)X_2+(-0,01)X_3+(0,38)$	5737
9.	The region of Karaganda	$Y=2,17X_1+(-504,5)X_2+(0,23)X_3+(-4,92)$	6135
10.	The region of Kostanay	$Y=1,03X_1+(323,98)X_2+(-0,00)X_3+(3,53)$	6381
11.	The region of Mangystau	$Y=-5,62X_1+(1614,2)X_2+(0,19)X_3+(15,37)$	5479
12.	The region of Kyzylorda	$Y=5,87X_1+(-4937)X_2+(0,18)X_3+(-11,62)$	5825
13.	The region of South Kazakhstan	$Y=-0,51X_1+(687,27)X_2+(0,01)X_3+(4,23)$	7183
14.	The region of Pavlodar	$Y=-3,02X_1+(1415,3)X_2+(0,11)X_3+(15,78)$	6474
15.	The region of North Kazakhstan	$Y=0,68X_1+(515,25)X_2+(0,01)X_3+(22,00)$	7236

Thus, the number of inhabitants per one drugstore in the urban area is-5513; in rural settlements – 5672 inhabitants per one drugstore.

#### 4. Discussions

Summing up matter consideration, we drew the following conclusions:

1. On the basis of a current state of the organization of provision of medicines of the population in the conditions of market economy, taking into account the main tendencies of development of the pharmaceutical market need of

development of standards of development and placement pharmaceutical establishments in the Republic of Kazakhstan is revealed.

2. As a result of the retrospective and comparative analysis features of the present stage of development of a network of the retail pharmaceutical organizations consisting in advancing development of a network of the enterprises of a retail link, caused conditions of the rigid competition in the pharmaceutical market are characterized.

3. Major factors developments of pharmacy network, most influencing standard indicators are



revealed: demographic, pharmaceutical, medical, social and economic.

4. As a standard sign the indicator "number of inhabitants on one pharmacy" is accepted.

5. As a result of the step-by-step analysis the equations of the regression which have entered then into model on an indicator "Number of inhabitants on one pharmacy" in city and separately rural areas are received.

Thus, standards of development and placement of pharmaceutical institutions for all regions of Kazakhstan are calculated.

The made methodical recommendations will form a basis for standard and legal regulation of development and placement of pharmacy network in the Republic of Kazakhstan. And use of the developed standards in practical activities of pharmacy will promote efficient placement of pharmaceutical institutions in regions of Kazakhstan and to development of the civilized pharmaceutical market.

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