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The Effect of the Quantity on the Quality in the Evaluation of the Population Satisfaction with the Medical Infrastructure Facilities (By the Example of the Republic of Tatarstan).

Gabdrakhmanov Niyaz Kamilevich*, and Egorov Dmitry Olegovich.

Kazan Federal University, Kremliovskaya str, 18, 420008, Kazan, Russian Federation.

ABSTRACT

The task of the study consisted in identification of correlation between the provision of population with the medical infrastructure facilities and their satisfaction with the operation of these facilities. In the programs of development of the countries of the world the benchmarks in the forms of the high standards of operation of the health care facilities, the leveling thereof from the territorial and social perspective are described. By the example of the Republic of Tatarstan this paper proposes the methodological approach to comprehensive analysis of the medical unit of the regional social infrastructure. During the comprehensive analysis we used the indicators taking into account the presence, level of development (subjective estimate), economic efficiency, social satisfaction (objective estimate) with the social infrastructure facilities (medical unit). For evaluation of the population satisfaction there was conducted the direct questioning with the general sample of 5 000 persons broken down by the territory with assignment of the index estimate. For assessment of economic efficiency we used the procedure taking into account the financial losses arising from the temporary incapacity of the employed population of the region. The results of the study were presented in the form of map charts (by all indicators), there was also designed a map chart with the matrix representation of the subjective and objective estimates that allows identifying the differentiation of the districts of the republic by the indicators under investigation. The use of this approach is also substantiated for the rest of calculations in case of evaluating an array of heterogeneous information.

Keywords: infrastructure, medical geography, regional development, economic efficiency, satisfaction, matrix representation of indicators, competitiveness, the Republic of Tatarstan.

**Corresponding author*

INTRODUCTION

The design of the strategies of health care development in the cities, municipalities and in the region in whole муниципалитетах is an important part of the socio-economic planning of any country [1, 2, 3]. The population satisfaction with the social infrastructure facilities may serve as the measure of efficiency of the government authorities' activity. The priority objective of the territory development shall comply with the Article 7 of the Constitution of the Russian Federation stating that the policy of the Russian Federation as a social welfare state shall be aimed at creating conditions ensuring the dignified life and free development of a person. This interpretation is also acceptable at the regional level. Thus, in particular, the program of the socio-economic development of the Republic of Tatarstan for the years 2011-2015 approved by the Law of the Republic of Tatarstan d/d 22.04.2011 № 13-ZRT defines the high standards of the health care operation as one of the benchmarks. Improvement of the quality of medical care is defined to be the strategic objective of the socio-economic development of the RT.

In this program it is also noted that 'as of today in the Republic of Tatarstan there is a regulatory framework determining the scope of the government guarantees concerning provision with the services of the social sphere facilities. However, there is still huge differentiation by this parameter between the municipal and urban districts" [4]. The previously performed analysis allowed identifying the three main causes of this phenomenon:

- Absence of the centralized system of accounting of the social infrastructure facilities which results in the erroneous decisions in respect of construction of a new facility;
- Absence of consideration of demand for services rendered by social facilities depending on the demographic and medical situation in the region;
- The social infrastructure facilities under liquidation or temporary not working that cause additional differentiation of provision.

Besides, by allocation of budgetary funds for construction of a new facility the priorities of development of the social sectors are not always taken into account.

SETTING OF THE PROBLEM

Therefore, the conclusion may be drawn that the analysis of districts of the Republic of Tatarstan on the issues of provision with the objects of the medical unit of the social infrastructure and determination of the level of efficient operation thereof will allow solving the issue of territorial asymmetries in provision of services by medical institutions.

Instead of the existing regulatory principles of assessment of operation of the medical unit of the regional social infrastructure in the presented study it is proposed to use the geo-demographic approach which includes:

- Accounting of the medico-demographic characteristics of population requiring some or other medical services;
- Comparison of the qualitative and quantitative indicators of operation of the medical unit of the regional social infrastructure with the figures of sociological surveys on the issues of satisfaction with the activity of these objects which will allow comparing the statistical indicators with the real estimates of the region citizens (subjective and objective estimates);
- Application of the GIS-technologies for solution of the tasks set.

As was mentioned above, today in Russia there is the regulatory framework for the medical facilities of the social infrastructure [5] in which the standards of provision with these facilities are specified. However, there is significant differentiation by the demand for medical services in the regions.

We believe that the reason of such differentiation is the medico-socio-demographic heterogeneity of the population from the municipal perspective. This is why it shall be referred not only to the regulatory

provision with the objects of the medical social infrastructure but also to the provision with its objects from the spatial-demographic perspective, namely, to the medical geo-demographic infrastructure [6, 7, 8, 9].

Based on this assumption the study aimed at identifying the optimal options of development of the medical care in the region and its municipalities gains the topicality.

MATERIALS AND METHODS

This study is based on the statistical data of the Republican medical-analytical center of the Republic of Tatarstan (RMIAC RT) for the years 2010-2014. Totally, 43 municipal and 2 urban districts have been examined. The data about the population size, mortality by gender and age, causes of death, hospitalization rate, morbidity rate, life expectancy, provision with doctors, provision with beds, provision of the country dwellers with nurses, mortality ratio bed-days, average economic losses per a single case of the *i*-th morbidity, national income, average daily allowance for temporary disability, the cost of treatment per one patient per one calendar day.

For evaluation of the level of development of the medical unit of the social infrastructure (*G*) during the study we used the index of performance of the medical unit of the social infrastructure with account for the geo-demographic approach:

$$G = \frac{(P \cdot U_g \cdot R_b \cdot D) \cdot (S_s \cdot S_b \cdot F)}{K_s \cdot S_d},$$

For calculation of this index 3 units of indicators have been taken into account:

1 unit: medico-demographic indicators,

Where *P* – the rank of the size of population in the region, relative quantity calculated by division of the total population of the region by 10 000;

U_g – the hospitalization rate (economic calculation) per 10 000 persons within the region;

R_b – morbidity rate per 10 000 persons of the annual average resident population of the region,

D – ratio of the life expectancy in the region;

2 unit: medico-infrastructurel,

Where *S_s* – provision with doctors per 10 000 persons in the region;

S_b – provision with beds per 10 000 persons in the region;

F – provision of the country dwellers with nurses at the feldsher's station per 10 000 of country dwellers;

As is seen from the indicators by calculation the structural features of the regional medical infrastructure are taken into account. The index of provision with medical professionals at the feldsher-midwife stations for country dwellers is also being considered.

3 unit (decreasing factors) of negative values in the medical infrastructure of a municipality,

Where *K_s* – intensive mortality rate per 10 000 persons for different causes of death;

S_d – bed-days (economic calculation) per 10 000 persons [10, 11].

For interpretation of the results obtained the method of quantiles was used – the upward ordering of objects based on the attribute values. And the number of objects is summed up as they are sampled. The total value is divided by the number of classes as the result of which the number of objects in each class is calculated. The objects are included by in a class in order starting with the minimum values up to the complete filling of the class after which transfer to other classes is performed. The emphasis is not laid on any group of mapped indicators and only the relative difference between the districts is the visually highlighted [12].

The studies show [13, 14] that the health care system shall be assessed not only from the perspective of provision but also from the perspective of the economic efficiency of the health care facility activity. It is the economic efficiency that in these latter days serves as an indicator of activity or social structures including the medical ones [15, 16].

The health of population and the economy of the region are closely interrelated. Thus, an economically developed region is able to allocate more funds for the health care development while also the population of the region with the low morbidity rate promote to faster, more intensive development of the region due to lesser losses caused by temporal disability of the economically employed part of the population.

The loss of the public health (morbidity, temporal and permanent disability, mortality) results in the huge economic damage. By the most conservative estimate the loss of health of the population employed in the Russian economy annually is ratable at 6,5% GDP [17].

Morbidity accompanied by temporal disability occupies a special place in the morbidity statistics due its high economic significance. This phenomenon – one of the kinds of morbidity by appealability – is the priority characteristic of the health status of workers. Morbidity accompanied by temporal disability characterizes occurrence of those cases of workers' sickness that resulted in non-attendance.

For assessment of the economic efficiency of the healthcare system the economic benefit from reduction of the morbidity rate was estimated (Ξ):

$$\Xi = Y_{ic} * (C_{bi} - C_{pi}),$$

Where Y_{ic} - average economic losses as per a single case of the i-th morbidity;

C_{bi} - the number of cases of the i-th morbidity during the basic period (or under basic conditions);

C_{pi} – the number of cases of the i-th morbidity during the accounting period (or under rated conditions).

The average economic losses from a single case of i-th morbidity (Y_{ic}) may be estimated according to the formula:

$$Y_{ic} = [(D+B) * t_{ki} * 0,68 * P/4] + \Pi_{i+t_{ki}}$$

Where D – national income (net output) produced per one worker per one working day, rubles;

B – average daily allowance for temporary disability at the cost of the social insurance funds, rubles;

t_{ki} – average duration of a single case of i-th morbidity in calendar days;

0,68 – rate of conversion of calendar days into working ones;

$P/4$ – the share of workers (P) in the total number of patients (4);

Π_i – cost of treatment per one patient per one calendar day, rubles [9, 11, 12].

The obligatory constitutional unit of the health care assessment shall be positioning of the sector through the social satisfaction. This shall mean the objective (since the opinion is expressed by the consumers of services) estimate of the quality of medical services rendered.

One of the common methods of assessment of the quality of services rendered by medical facilities is the mass survey – it is the comments of customers that help to understand the issues they faced during servicing. Such surveys shall be definitely performed beyond the walls of the institution the respondent applied to, namely, on a neutral territory with the anonymity guaranteed.

The generally accepted provision concerning the positive aspects of using the sampling method in the social surveys may be reduced to the following aspects. Firstly, the use of the sampling method allows saving not only funds but also the time and efforts of researchers as the complete polling of the population requires significant financial and labor costs.

Secondly, this method implements the fundamental principle of randomization, i. e., random sampling. The absolutely random nature of sampling guarantees the equal chances of including either of the elements in the sampling and ensures minimization of the intentional or unintended distortions [18].

There was performed the sociological survey ‘Concerning the satisfaction of the population with the quality of the medical services rendered broken down by municipal formations and urban districts» [19]. The total sampling made 5 000 persons, the type of polling – direct questioning.

The questionnaires included the following questions with different variations for out- and in-patient departments (Table 1).

Table 1: Questions in the questionnaires «Concerning the satisfaction of the population with the quality of the medical services rendered broken down by municipal formations and urban districts» used for analysis of satisfaction

Out-patient departments	In-patient departments (additional questions)
No complaints	Lack of beds in the in-patient department
Absence or lack of out-patient departments	Lack of beds in the in-patient department
Remoteness of institutions and/or absence of the public transport to get to the medical institution	Absence of necessary equipment
Poor qualification of the medical staff	Need to ‘remunerate’ the medical staff for everything
Uncaring, rude attitude of the medical staff	Premises requiring repairs, poor sanitary conditions
Impossible to visit the specialized doctors	
Waiting for visiting the primary care (local) physician	
Almost all services are provided on a fee-paid basis	
Absence of necessary equipment	
Cramped, unaccommodated premises	

For estimation of the index of the ‘social satisfaction’ by the facilities of the medical unit of the social infrastructure the calculations according to the following formula (procedure) were performed

$$IS = \frac{C_{Pi}}{\sum NF_i}$$

Where IS – the index of social satisfaction;
C_{Pi} – the share of respondents satisfied with the quality of medical services in the i-district in %;
∑NF_i – the amount of negative responses or lack of equipment mentioned by respondents in the i-district in %.

RESULTS

By evaluation of provision of municipal formations with the medical infrastructure facilities there was determined the optimal number of classes – 5, in case of a larger amount the difficulties while searching the objects with approximate values arise. For the color presentation of indices the red color was chosen for the low values – as the one that associates with danger; and the green color – for the optimum values – as the one that associates with safety. The estimate results are presented in the map chart (Fig. 1):

Into the Republic of Tatarstan there are 43 districts and 2 cities of republican status (Kazan and Naberezhnye Chelny). Since the research procedure is designed for the entire municipality in whole (including rural settlements) the indices of the 2 cities were put beyond the scope of the quantitative study. The distribution by the index of operation of the medical unit of the social infrastructure appears as follows:

- Critical index in 28 districts of the RT;
- Pre-critical index in 6 districts of the RT;
- Average index in 5 districts;

2 RT districts obtained the highest scores in the index of the social infrastructure:

- Above the average index in the Yelabuga district
- The maximum value of the operation index in the Zelenodolsk district.

Although matching of districts with the assigned indices was not performed with regard to economic zones, having performed the visual analysis by the Fig.1 the distinct groupings of districts by the calculated index may be distinguished. Thus, if we combine into a single group the extremely low and low indices we will get 2 areas with the worst indices: the South-Western (Nizhnekamsk economic zone) and the North-Eastern (Metropolitan economic region, Pre-Volzhskiy economic zone, Predkamsk economic zone). Having combined the indices: average, above average and high (positive) index we have distinguished the central-south-eastern area with the highest figures.

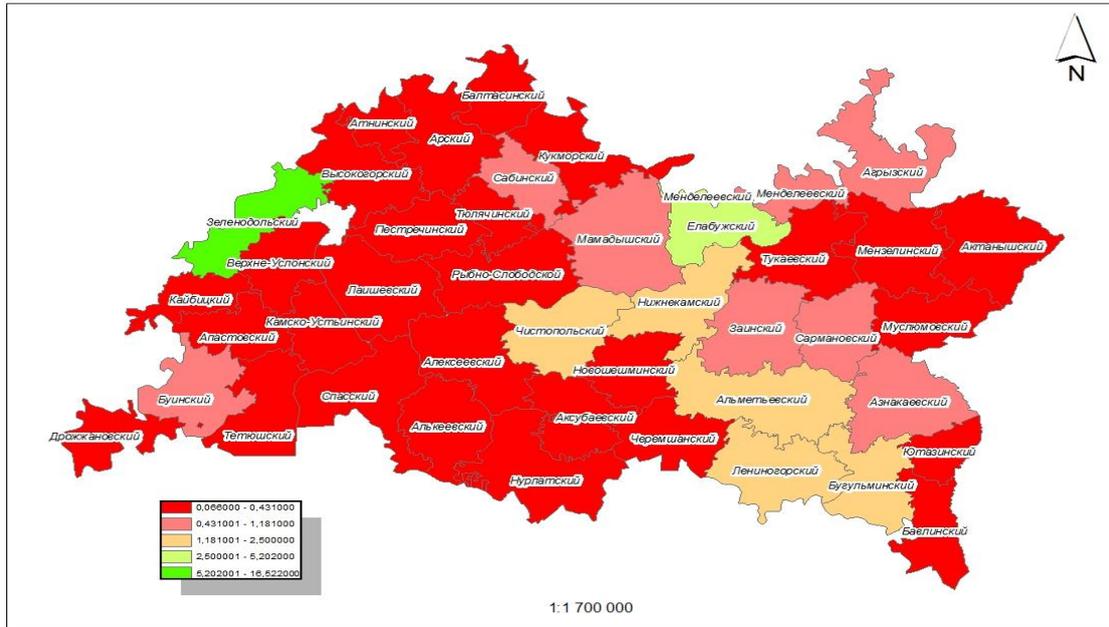


Figure 1: Index of operation of the medical unit of the social infrastructure

Results of estimation of the economic efficiency of the health care system are presented in the map chart (Fig. 2).

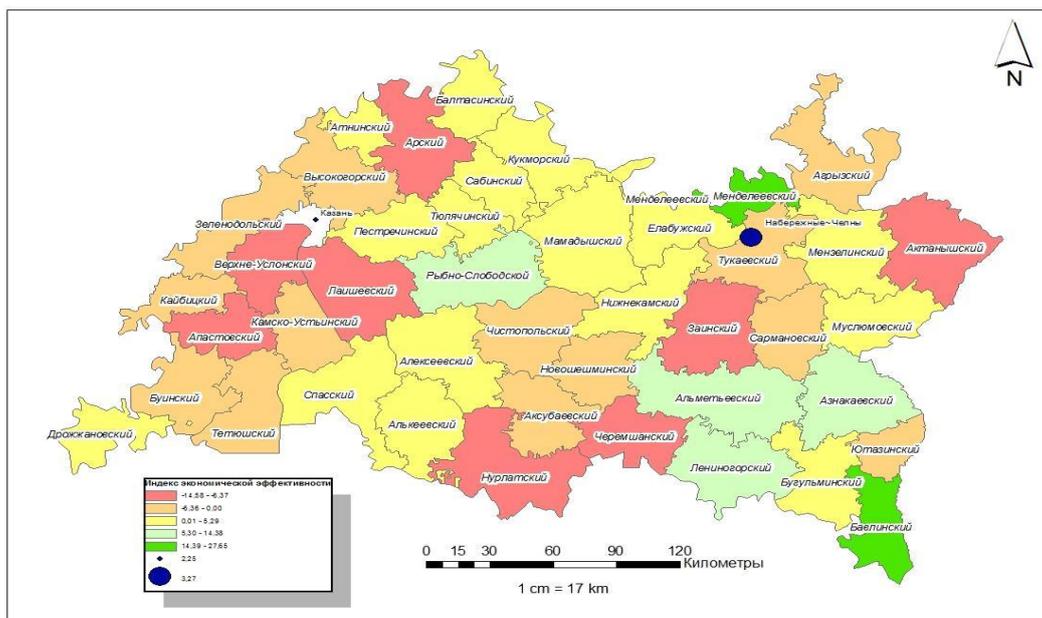


Figure 2: Index of the economic efficiency of the health care system

The results of estimates allowed us distinguishing the districts with the negative and positive economic efficiency based on the change in the temporal disability rate for the previous 2 years with further grading by these values:

- The calculations showed that 19 of 43 districts of the republic feature diseconomy caused by the changes in the temporal disability rate during the last 2 years.
- 18 districts have positive but not high values of the economic efficiency (slightly above the zero value).
- 6 districts are characterized by the high value of the economic benefit from changes in the temporal disability rate.

Therefore, after calculation of the quantitative ratings of operation of the medical component of the social infrastructure and its economic efficiency they were identified the municipalities requiring more attention on the part of the authorities of the local socio-medical development.

The results of calculation of the index of the population satisfaction with the medical infrastructure facilities are presented in the map chart (Fig. 3):

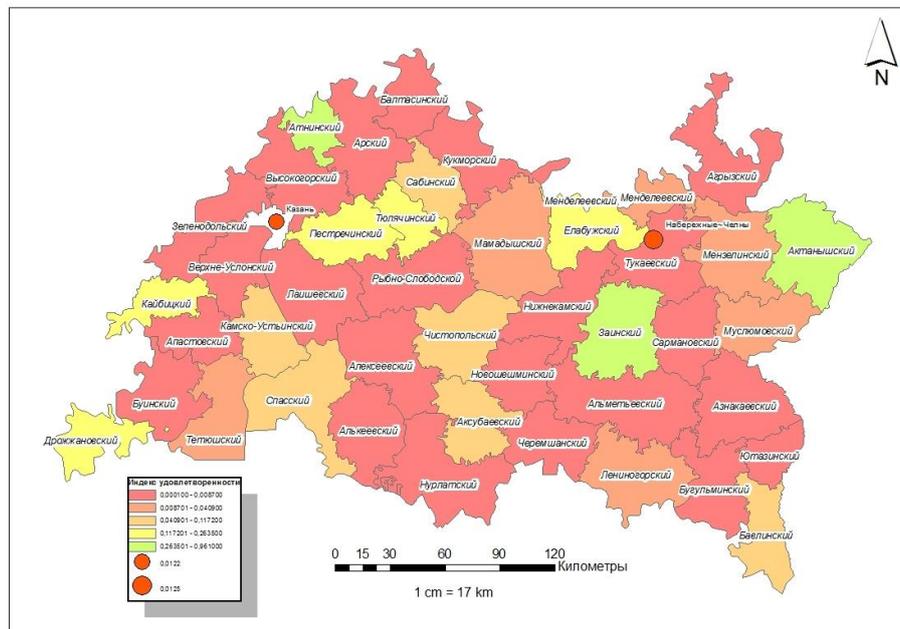


Figure 3: Index of the population satisfaction with the medical infrastructure facilities.

As can be seen from the map chart most of municipalities were referred to the 1st group (unsatisfactory index) - 23 districts; then in the 2^d and 3^d group – per 6 districts in each (average index); positive index – 5 districts in the 4th group and 3 districts in the 5th group; Kazan and Naberezhnye Chelny were classified among the unsatisfactory group of indices.

CONCLUSION

Having obtained the subjective (index of performance) and objective (index of satisfaction) indicators for the medical unit of the social infrastructure of region the necessity arose to compare the results obtained with the objective of identifying the districts [15, 16]:

- With low indicators of the subjective and objective indices for searching the districts requiring measures aimed at improvement of the position in the medical sphere;
- With high values of this in the indices for identification of the leading municipalities with which the comparison may be performed;
- With differentiated indicators, i.e., specifying the municipalities with opposite values.

One of the solutions seemed to be making of the integrated map combining the display of two indices (for example, one as the quantitative background and the other one – in the form of a diagram) [20, 21, 22].

Another solution may be making of the map of correlations, namely, the map of zoning by the degree of correspondence performed by means of graphic overlaying and outlining the areas of the full and partial correspondence [12].

In order to solve the task set the map-matching method was used – the analysis of the series of maps of various subjects for identification of possible correlations and dependences between the indicators being investigated.

For representation of the subjective and objective indicators on the same map chart the authors' team designed the matrix method of the indicator presentation. The essence of the method consists in arrangement of the previously obtained indicators in the form of a matrix (indicator of provision – horizontally and that of satisfaction – vertically). Having used this method we distinguished 12 groups of municipalities on the map chart (from 25 possible). The results of calculations are presented on the map chart (Fig. 4).

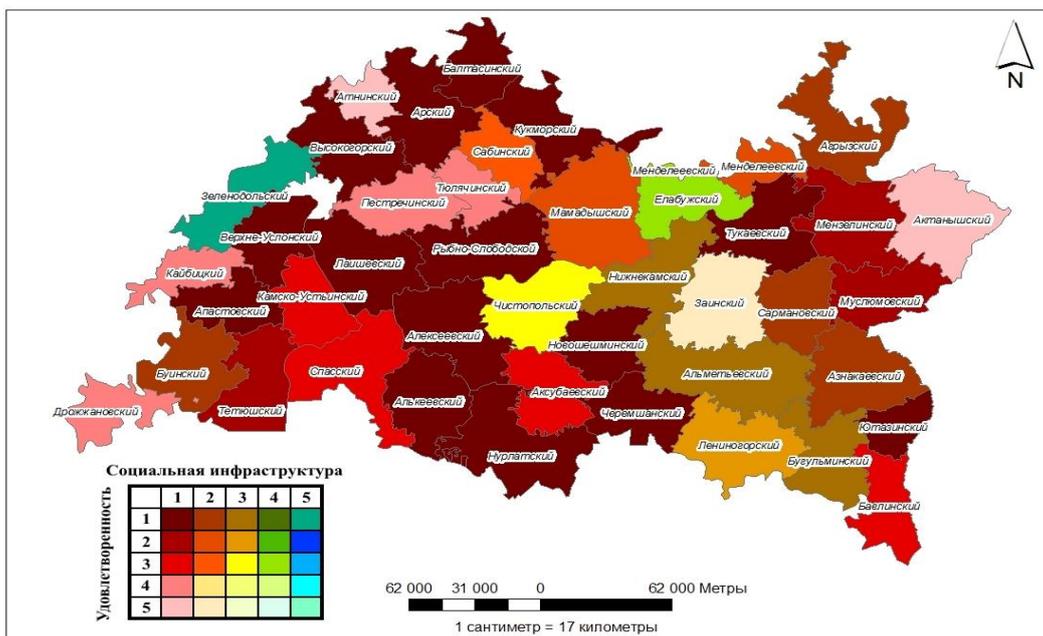


Figure 4: Correlation of the subjective and objective indicators of the medical unit of the regional social infrastructure

The correlation made 0,058 which is indicative of the neutral correlation between subjective and objective indicators of the medical unit of the regional social infrastructure [23, 24].

The most frequently used classes with indices – 1 category (minimum) by the social infrastructure and social satisfaction (15 districts with such matrix indicator) as well as 7 districts with the 2 first crisis indicators. The best aggregate indicators – Leningorsky, Chistopolsky, Zainsky and then Yelabuga district.

The method designed also allowed identifying the municipalities with differentiated indices [25, 26, 27] between the 2 investigated indicators.

The presented study will allow formulating the necessary recommendations and introduce adjustments to the implemented programs and projects of the regional development authorities and health services.

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