RISK MANAGEMENT. RISK COMMUNICATION

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CLASSIFICATION'S FEATURES OF OBJECTS OF SANITARY AND EPIDEMIOLOGICAL SURVEILLANCE BY RISK OF CAUSING THE DAMAGE TO HEALTH OF THE METROPOLIS' POPULATION

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Abstract. *As the guidelines for surveillance and enforcement risk-oriented model are being implemented in such a megacity as Moscow we have defined that some factors like high population density, great volumes of consumer goods (first of all, food stuffs) and services provided for population by economic entities can lead to increase in population risks levels. Population health damage caused by any company or private entrepreneur correspondingly means moving of companies operating in this sphere and being under surveillance into higher risk category than their counterparts working in other regions. The share of economic entities running extremely high risks of breaching sanitary legislation in megacities amounts to 4% and of those running high risks – to about 12%; it is 2-2,5 times higher than in the Russian Federation on average. It results in greater labour costs of any inspection and, correspondingly, increased workload for surveillance authorities. But at the same time according to our researches more than 20% of all economic entities under surveillance have very low health damage risk level and can be released from any scheduled inspections. According to classification results we ascribed small and medium sized businesses to this category. Generally implementation of a risk-oriented model into surveillance and enforcement in a densely populated industrial and trade city of Moscow provides significantly greater inspection precision and efficiency of Moscow population life and health protection.*

Key words: *risk-oriented surveillance, economic entities classification, megacity, planning*

There is a whole variety of processes taking place now in the Russian Federation economy. We can see technologies developing practically in all spheres of economic activities – power engineering, industries, communal services, catering, health care and so on. And simultaneously a lot of new substances and materials appear and they are sometimes used without any assurance if they meet hygienic standards [3, 7]. The state provides legal and financial support for small and medium-sized business. However there are violations of sanitary requirements for air quality as well as soil quality in cities and in the countryside, natural water sources quality etc. Falsified, low quality and sometimes even dangerous goods and services can be offered to population. And as a result we can see deterioration of environment quality leading to medico-demographic losses which are represented by additional mortality and morbidity of population, including laboring population employed in GDP production [7, 11]. In 2014 economic losses only from decrease in GDP value related to mortality and morbidity of economically active population exceeded 170 billion rubles; grown mortality and morbidity rates were caused by negative influence of environmental factors. [7]. The current legislation requires 1 scheduled inspection in three years so government surveillance and enforcement services are unable to provide strict control over economic entities running the most significant risks for population, workers or consumers. Researches in Higher School of Economics have come to a conclusion that existing surveillance and enforcement system in Russia "costs" from 1.5%

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to 7% of GDP and still it cannot provide the required level of protection for the society [1, 2]. Obviously the situation calls for development of new modern public management technologies.

State enforcement reform should secure the balance between state, business and society interests [4, 5]. Generally we speak about lowering the administrative barriers for economic entities and at the same time providing regulated and acceptable security level concerning guarded society values such as life, health, property etc. And risk-oriented model implementation is seen as the most efficient way to develop surveillance services under these circumstances [6, 12-15].

Federal service for surveillance on consumer rights protection and human well-being sees guaranteeing hygienic and epidemiological safety of the population as its main objective. We understand safety as absence of intolerable risk for citizens' lives and health. Orientation at intensifying surveillance over economic entities running the highest risks for life and health and also decreasing it over ones with lower levels of risks corresponds to contemporary social challenges and the overall concept of surveillance and enforcement reform in the country.

The Chief State Sanitary Inspector recommends adjusting and implementing guidelines for economic entities' classification when planning annual inspection schedule. These guidelines are in full conformity with governmental advice for surveillance development [8, 10]. The approaches are based on assessing potential health damage risks which can appear during or as a result of economic activity. Here any potential risk is defined as a combination of probability, health damage severity and number of people influenced by activities of an economic entity that violates sanitary and epidemiologic regulations in consumer rights protection sphere.

We assume that health damage risk appears when an economic entity under surveillance breaches requirements for human sanitary and epidemiologic well-being and consumer rights protection set by legislation. Violation of legislation in the sphere of sanitary and epidemiologic welfare and consumer rights protection determines possible deterioration of environment and health damage done to population, workers and consumers influenced by an economic entity's activity. When adapting these guidelines to a megacity conditions we should take the following basic principles into account: unanimity of approaches to risk sources registration, assessment and criteria transparency, systemacy of multifactor relations analysis comprising a great number of a megacity environment parameters, risk scaling, differentiation of surveillance regulation, surveillance intensity and volume determined by a megacity peculiarities, priority of economic entities with high potential of health damage risk. We should also remember that any economic entity operating in a megacity environment with a certain degree of compliance gets higher risk category. Economic efficiency of approaches and appropriate resources required for risk-oriented regulation are also of great importance.

On the basis of the data received from Moscow and some regions of the country we have worked out certain class characteristics for economic entities operating in various spheres of activity. These entities can belong to different categories regarding potential health risks levels [3].

The research objective was to define class characteristics of economic entities under sanitary surveillance in Moscow as a megacity with high population density and to reveal peculiarities of these characteristics in comparison with average ones in the Russian Federation regions.

Volumes and techniques. We have carried out our research using data taken from the regional register comprising 27,518 companies and private entrepreneurs and 45,095 property complexes belonging to them. These companies and entrepreneurs operate on Moscow territory and their activity is subject to sanitary and epidemiologic surveillance and enforcement in the sphere of consumer rights protection [9]. Traders, catering, personal services and health care facilities prevail among these companies and entrepreneurs in Moscow (Table 1).

The register contains data for each economic entity concerning the main sphere of activity, other activities, and addresses of property complexes where all activities take place, labor force quantity, and the number of people influenced by harmful emissions, communal and industrial wastes disposals caused by an economic entity's activities etc.

We have assessed health damage risk potential for each registered economic entity with the use of developed techniques. When assessing possible effects we took the real population density in each administrative district into account (table 2)

Table 1

Structure of economic entities under sanitary and epidemiologic surveillance in Moscow as per their main activity

Main activity of economic entities subject to sanitary and epidemiologic surveillance	Number of economic entities in the register	% of the whole number of entities under surveillance
Food stuffs trade including beverages and tobacco trade	5234	27.96
Catering	1900	10.15
Health care facilities (except children health stations)	1791	9.57
Personal services	1358	7.25
Other industrial enterprises	1311	7.00
Retail trade in pharmaceutical products	1052	5.62
Educational organizations	555	2.96
Processing industries	549	2.94
Preschool educational organizations	478	2.55
Complementary education organizations	364	1.94
Food stuffs production including beverages; tobacco production	359	1.92
Rest and entertainment facilities. cultural and sport facilities (92)	339	1.81
Construction	252	1.34
Higher educational establishments	210	1.12
Public transport	198	1.06
Additional and supplementary transport activities	178	0.95
Hotels and other part-time residence places	139	0.74
Waste disposal	96	0.51
Professional education organizations	73	0.39
Communication	59	0.31
Social services (except children educational facilities)	57	0.30
Production. supply and distribution of electricity, gas, steam and hot water	50	0.27
Orphanages and facilities for children deprived of parental care	20	0.10
Children health stations (85.11.2)	18	0.10

Children rest facilities and recreation facilities including day stay	12	0.07
4.2. including (from page 48): agriculture, hunting (01), forestry (02)	29	0.15
Other activities	2068	11.05

Table 2

Population density in administrative districts of Moscow[1]

Administrative district	Square, hectares	Total population, people	Population density (men/km^2)
Vostochniy (Eastern)	15 483.55	1 489 765	9622
Zapadniy (Western)	15 303.43	1333813	8716
Zelenogradskiy	3 719.99	229926	6181
Severniy (North)	11 372.60	1 141 913	10 041
Severo-vostochniy (North-eastern)	10 188.3	1 398 481	13726
Severo-zaoadniy (North-western)	9 328.1	973629	10438
Ztentralniy (Central)	6 617.55	757 137	11 441
Yugo-vostochniy (South-eastern)	11 755.97	1352303	11503
Yugo-zapadniy (South-western)	11 136.22	1407331	12637
Yuzhniy (South)	13 177.29	1754613	13315
troiztkiy	108 434.00	103365	95
Novomoskovskiy	36 136	165981	459
Moscow	252 653.00	12 108 257	4 792

[1] Web-site http://www.statdata.ru/naselenie-moskvy-po-okrugam-i-rajonam [date of visit Feb 11, 2016]

Main results. In general health risk calculations in Moscow and economic entities classification accomplished with the help of them have shown that:

- economic entities under sanitary and epidemiologic surveillance differ greatly in the levels of potential health damage risks;
- extremely high and/or high health damage risks can be caused by activities of companies and/or private entrepreneurs operating in many various spheres, from industries to health care and education (table 3).

Generally we can mention a greater share of economic entities belonging to extremely high and high health risk category than in Russia on average as a peculiarity of Moscow as a megacity. Thus, the 1st risk category (extremely high health damage risk) amounts to 4% of all economic entities; the 2nd risk category (high health damage risk) is 12%. Companies and private entrepreneurs whose activities can cause substantial health damage (the 3rd risk category) account for 23% of all economic entities under sanitary surveillance.

The share of economic entities belonging to categories of average and moderate risk potential is about 39%. More than 21% of all registered economic entities run low health damage risks and can be released from any scheduled sanitary and epidemiologic inspections (picture 1).

We have defined that economic entities belonging to extremely high and high health risk categories account for 1/3 of all economic entities but more than 97% of all potential health damage risks for population (workers, consumers) result from their activities (picture 2).

Hence surveillance over the 1st and 2nd category of economic entities allows providing maximum efficiency of surveillance and enforcement. Surveillance services and economic entities themselves should see minimizing risks as their primary objective.

50.9% of the economic entities belonging to 1st risk category and for whom the most frequent inspections are required are food stuffs production enterprises and catering facilities. Among them we can name “Vkusniy mir” LLC, “Tander” Ltd, “Viskont-M” LLC, “Kikoyaretoran” LLC, “Diamond Fish” LLC and many others.

This great share of food stuff production, catering and food stuffs trade in the 1st risk category is a specific feature of a megacity determined by a number of peculiarities. For example here we can name considerable volumes of food stuffs distributed on a megacity market, greater seat turnover for catering facilities than on average in the country, greater number of goods and services consumers per one economic entity.

Industrial enterprises account for more than 32.8% in this category (among them there are “NPO Radiy” Plc, “Promyishlenno-stroitemnaya kompaniya PIKS” Ltd, “Moskovskiy neftepererabatyivayusthiy zavod” Plc etc.).

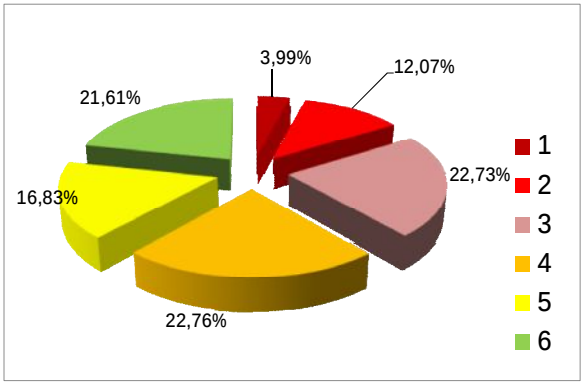
14.8% are medical and preventive facilities (they are mostly large multi-field hospitals with day and night clinics including isolation wards and surgeries).

Table 3

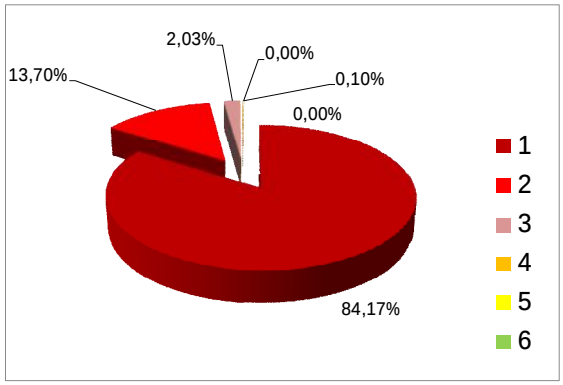
Structure of economic entities operating in various spheres classified according to health damage risk categories in Moscow

(%)

Activity (aggregated)	Health risk potential category						
	1	2	3	4	5	6	Total
Health care, communal, social and personal services (total)	1.27	0.76	29.98	22.78	14.69	30.51	100
Children and teenagers educational facilities (total)	0	13.04	7.62	51.66	17.78	9.89	100
Food stuffs production, catering and food stuffs trade (total)	6.88	15.41	8.27	18.32	29.56	21.56	100
Industrial enterprises (total)	7.90	37.64	34.42	17.90	0.26	1.87	100
Public transport (total)	13.16	1.32	30.26	35.53	0	19.74	100



Picture 1. Structure of economic entities under sanitary and epidemiologic surveillance in Moscow (2015) classified by health damage risk



Picture 2. Shares of companies and private entrepreneurs belonging to various risk categories in aggregated health damage risk for population (workers, consumers) of Moscow caused by sanitary legislation violation

1- Extremely high risk; 2 – high risk; 3 – substantial risk; 4 – average risk; 5- moderate risk; 6 – low risk

We also put such large water suppliers as "Mosvodokanal" State Unitary Enterprise, "Sheremetievo" International Airport Plc and others, into this category as well as a number of companies dealing with industrial and communal wastes disposal and long storage (for example, "Dominanta" Ltd) etc.

The second category (economic entities with high risk potential) differs greatly from the first one in its structure. Here we mostly note health care facilities and companies providing communal and personal services. 61.2% of this category comprises multi-field hospitals with day and night clinics with the number of beds from 300 to 1000 and an overall contingent from 10 to 80 thousand people (out-patient departments included), perinatal centers and maternity hospitals with 10,000 or more deliveries per year. We also include water parks and swimming pools with total capacity of visits from 3,000 to 10,000 as day in the 2nd category (high risk potential).

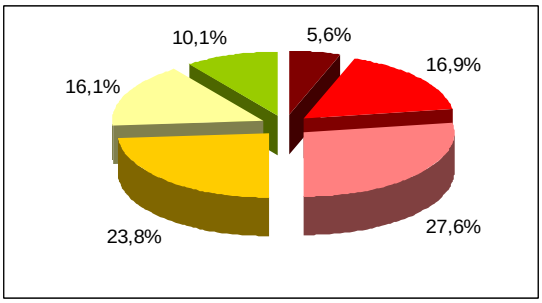
Some medium-sized industrial enterprises located in close proximity to apartment blocks in densely populated districts (Yugo-Zapadniy, Yuzhniy, Yugo-Vostochniy) are also included into high risk potential category accounting for 25.1% of it. We should also note that such enterprises located in other districts can be classified as having average or even moderate risk potential due to much lesser population density in emission zones.

Children education facilities amount to only 2.4% in high risk potential category; here we mostly mean comprehensive secondary schools with maximum number of pupils (about 1,000).

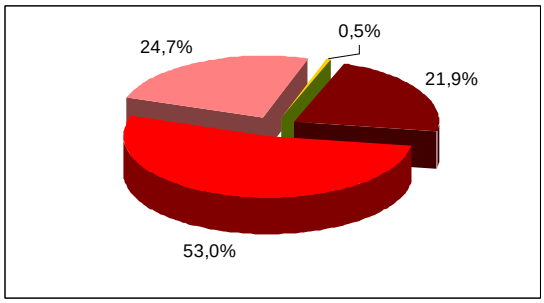
The structure of the third (substantial risk) and the forth (average risk) categories is similar to that of the second one, but economic entities placed into this category as a rule are characterized with less number of people exposed to their impacts. They are smaller enterprises or enterprises located in areas with low population density (Troizkiy and Novomoskovskiy administrative districts), smaller medical and preventive facilities or catering facilities, as well as retail outlets with smaller trade areas.

We can see practically no industrial enterprises or transport facilities among the fifth category of economic entities on Moscow territory. This category contains mostly small private services companies, retail outlets and personal services providers. We also place swimming pools with a number of day visits from 10 to 100 into this category.

It seemed important to assess the sixth category structure as this category comprises economic entities with low health damage risk potential. Such entities are to be released from scheduled inspections from 2018. According to the latest assessments carried out in Moscow the following economic entities can be put into this category: small personal services providers (hairdressers', dressmakers' and consumer services), small retail outlets that do not sell food stuffs etc.



Picture 3. Structure of economic entities under potential surveillance and enforcement activities in Moscow in 2016.



Picture 4. Structure of economic entities included into the final inspection schedule in 2016

1 - extremely high risk; 2 – high risk; 3 – considerable risk; 4– average risk ; 5- moderate risk; 6 – low risk

In Moscow such economic entities account for about 25%. But we should point out that these 25% generate not more than 0.05% of all health damage risks. If we exclude these economic entities from scheduled surveillance and enforcement activities we will cut the quantity of inefficient inspections and be able to concentrate Federal Service for Surveillance efforts on economic entities with high health damage risk.

Taking peculiarities of economic entities' classification into account allowed us to draw up inspections schedule in Moscow Federal Service for Surveillance Office (Rospotrebnadzor) for 2016 within the frameworks of risk-oriented model.

According to current legislation about 11 500 economic entities – both companies and private entrepreneurs – were subject to potential scheduled inspections in Moscow in the beginning of 2016. 21% of them were classified as running extremely high and very high health damage risk; about 28% had substantial health risk potential; the rest belong to categories of average, moderate or low risks (picture 3).

We estimated all resources available to surveillance and enforcement bodies and took risk-oriented surveillance model into account and made up an inspection schedule which included 100% of economic entities with extremely high risk potential (234 economic agents) and more than 80% of economic entities with high risk potential (566 out of 708) (picture 4). These economic entities are industrial enterprises exerting significant influence on city population environment, the biggest food production companies and trading networks and a number of large health care facilities and educational establishments.

More than 25% of inspections are planned for economic entities running substantial and average risk. However as the most dangerous economic entities are to be under strict surveillance we envisage field scheduled inspections for all economic entities. Mostly we plan to carry out integrated assessment of compliance to obligatory regulations in the sphere of sanitary and epidemiologic well-being and consumer rights protection as well as to provide laboratory support for surveillance and enforcement activities.

To sum up we consider that the drawn inspection schedule for 2016 will allow us to provide surveillance and enforcement procedures for economic entities generating more than 97% of all health damage risks in Moscow.

The 2016 inspection schedule does not include any economic entities from low risk category. However we should say that some unscheduled inspections aimed at people life and health protection can take place provided that there is legal basis for them.

Conclusion

To conclude we point out that such megacity peculiarities as high population density, great volumes of consumer goods (first of all food stuffs) and services provided for population by economic entities lead to growth in population risks such as health damage risk and higher risk categories for economic entities in comparison with their counterparts operating in other regions.

A percentage of economic entities generating extremely high and high risks when breaching sanitary legislation in a multi-million city can be 2-2.5 times higher than in Russia on average. It results in greater labour costs of each inspection and corre-

spondingly greater workload for surveillance and enforcement bodies.

As the research results show more than 20% of all economic entities under surveillance in Moscow run low population risks for people health and can be released from scheduled inspections. This category according to the classification includes small personal services providers (hairdressers', dressmakers' and communal services companies), small retail outlets that do not sell foodstuffs and so on. Exclusion of such economic entities from inspections schedule ensured greater attention paid to economic entities having high risk potential simultaneously lowering administrative barriers for business.

Further improvement of risk-oriented surveillance can include regulation of scheduled inspections procedures for economic entities belonging to various health risk categories and development of comprehensive requirements for economic entities operating in various spheres. It also seems vital to carry out further research which will give us an opportunity to get more precise risk assessments for economic entities currently belonging to the same category. Thus, we consider it crucial to disaggregate food industries which in this study are thought to be homogeneous although for example frequency of sanitary legislation violation and its effects differ greatly for milk-processing plants, meat-packing plants or bakeries.

Similarly we should also disaggregate industrial enterprises which are now considered as "processing industries". Comparative assessment of risks generated by economic entities operating in the same sphere but using different technologies and equipment seems very promising.

To conclude we state that risk-oriented model implementation into surveillance and enforcement activities in such a densely populated industrial and trade megacity as Moscow ensures significantly greater efficiency of life and health protection for megacity population.

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