Population health as a basis for sustainable development of a region

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Abstract. A healthy life in harmony with the environment is one of the principles of sustainable development. We consider the incidence of the population as an indicator of the health of the environment. On the example of Samara region, we analyzed the infectious morbidity associated with natural conditions and diseases that depend on social interaction within the human population. The study was carried out on the basis of data on infectious morbidity in 35 administrative and municipal divisions of Samara region (8 cities and 27 municipal districts) provided by the Office of Rospotrebnadzor of the Russian Federation. On the basis of data on natural focal morbidity, we carried out zoning of the territory: 1) by the level of natural focal morbidity; 2) by the incidence of natural focal diseases. The authors, based on the data on the incidence of chronic viral hepatitis B and C, assess the age structure of the incidence. The authors analyze the relationship between the incidence rate of chronic hepatitis B and C with the level of socio-economic development in the region. The calculation of the socio-economic damage from the incidence of chronic hepatitis C was carried out. The statistical analysis of the influence of socio-economic indicators in the region on the incidence of tuberculosis was carried out. The research was carried out by methods of comparative and statistical analysis. Some formulas for calculating socio-economic damage are given.

1. Introduction
Public health and healthy lifestyle are one of the priority directions in the field of social and humanitarian policy of the state in the strategy of sustainable development. One of the main provisions of Russia's sustainable development strategy directly states: “Everyone has the right to a healthy and active life in harmony with nature in an ecologically clean and favorable environment” [1]. One of the threats to national security in public health protection, the President in his Decree "On the Strategy for the Development of Healthcare in the Russian Federation for the Period up to 2025" notes the high prevalence of viral hepatitis B and C, tuberculosis, natural focal diseases and the risks of new infections [2]. The document proclaims the goals, main tasks, priority areas of health care and the need to ensure measures to combat these diseases. The listed threats are relevant for Samara region. The purpose of this study is to analyze the incidence of these nosologies, substantiate the socio-economic damage inflicted on the state and society if the spread of these diseases is not prevented, and some ways to solve these problems.

Several natural focal infections are common in Samara region: hemorrhagic fever with renal syndrome (HFRS), tick-borne borreliosis, tick-borne encephalitis, leptospirosis, tularemia, rabies, West Nile fever. Cases of diseases for some of them are not registered annually and are sporadic.
Almost the entire northeastern part of the oblast’s territory falls into the Volga-Ural zone of HFRS; and the main share of natural focal diseases registered in the oblast falls on this infection (80-90%) [3].

The high prevalence of viral hepatitis B and C diseases is one of the pressing health problems. Sick people, both acute and chronic, are the source of the spread of viruses. The main route of transmission of infection is parenteral, through contaminated blood. The insidiousness of these viruses is that the acute form of the disease is mostly mild. Therefore, the disease often turns into a chronic form, which is difficult to treat, and can lead to the development of cancer, and ultimately to death. Viral hepatitis is mainly common among the adult working-age population. Long-term treatment and poor outcomes lead to significant economic costs and social losses for the regions and the state as a whole. Samara region is among the regions where the incidence of hepatitis C consistently exceeds the average Russian level. In some years, the excess in the incidence of chronic hepatitis C is up to 72% [4].

Tuberculosis is an even more dangerous and widespread disease. It is included in the top 10 diseases leading to death [5]. Basically, this disease is common among disadvantaged segments of the population in countries with a low level of development [6]. In Samara region, the number of cases of newly registered active tuberculosis is up to 80% of the total number of residents [4], of which more than half are active forms with bacterial excretion. Starting in 2012, the incidence rate in the region began to increase sharply and in 2013 exceeded the average Russian level by 31%.

2. Materials and Methods
The study was carried out on the basis of data on infectious morbidity in 35 administrative and municipal divisions of Samara region (8 cities and 27 municipal districts) provided by the Office of Rospotrebnadzor of the Russian Federation. For the zoning of the territory, we used data on the incidence of hemorrhagic fever with renal syndrome, tick-borne borreliosis, tick-borne encephalitis, leptospirosis, tularemia, rabies, and West Nile fever for the period 2000-2017. Zoning according to the incidence rate was carried out by ranking the sum of all average long-term incidence rates occurring in the administrative or municipal division. Data for urban districts were summarized with data for municipal districts within the territory in which they are located. Zoning by the incidence of natural focal diseases was carried out according to the number of natural focal nosologies recorded in the territory of the division during the period under consideration. We used ArcGIS 10 software to visualize the results.

To assess the age structure of the incidence of chronic viral hepatitis B and C, the authors constructed diagrams on the following scale: children under 14; 15-19 years old; 20-29 years old; 30-39 years old; 40-49 years old; 50-59 years old; over 60 years old. We chose the time period 2012-2016. During this period, the incidence of hepatitis B in Samara region decreased, while the incidence of hepatitis C increased. We used the standard Excel 2003 charting program.

The incidence rate of chronic hepatitis B and C may depend on various factors, including socioeconomic ones. To analyze the relationship between the incidence of hepatitis B and C with the socioeconomic indicators of the region, we selected such economic indicators as: the volume of food products sold within the division; retail trade turnover; average monthly salary. As a social indicator, the total living space per person. The authors conducted a comparative analysis to identify the influence of the level of socio-economic well-being on the incidence of hepatitis B and C. For this, out of 35 divisions of the region, according to agreed criteria, we selected divisions with high and low socio-economic indicators. Next, we compared the incidence rates of chronic hepatitis B and C in the selected groups.

We calculated the damage to the state and society from the incidence of chronic hepatitis C (CHC). Having only data on the number of cases of the disease, we were forced to resort to a number of conventions and assumptions. Calculations were made based on 2014 data. We offer some formulas and methods for calculating the costs of treatment, rehabilitation and social benefits per 1 sick person, as well as the losses that society incurs in a year from the withdrawal of 1 person from the production of the regional gross product.
The authors used statistical analysis to establish the relationship between socio-economic well-being in the region and the incidence of tuberculosis. We took into account the following socio-economic indicators of development in the region: the volume of food products sold within the division; retail trade turnover; average monthly salary; total living space per person and the incidence rate of active forms of tuberculosis. We performed multivariate cluster and correlation analysis using the STATISTICA 6.0 program.

3. Results and Discussion

3.1. Territory zoning by natural focal morbidity

Hemorrhagic fever with renal syndrome is the main natural focal disease in the Samara region. More than 80% of all registered cases of natural focal diseases fall on its share. The bank vole is the reservoir and carrier of the infection. In the region, there are three natural foci of HFRS: 1) forests of Samarskaya Luka; 2) forest park area around Samara; 3) forest-steppe zone of the northeastern part of the region. The average long-term incidence rate of HFRS in the Samara region (15.3 per 100 thousand population) exceeds the average Russian level (5.4 per 100 thousand population) by almost 3 times.

Tick-borne borreliosis and tick-borne encephalitis are widespread in the northeast of the region in the forest-steppe zone, where islands of mixed forest are found. Carriers of these infections are ticks, which are infected from their hosts by warm-blooded wild and domestic animals. In the region, tick-borne borreliosis is recorded more often than tick-borne encephalitis. The average incidence rate in the region, as a rule, is lower than the average for the Russian Federation, but in some years, in the regions where the disease is usually registered, it can be several times higher than the national average.

Leptospirosis is reported almost annually in the Samara region. In natural foci, infected predatory animals, artiodactyls and rodents can be sources of infection. In economic centers, these are large and small ruminants. The average long-term indicator for the region (0.5 per 100 thousand of the population) exceeds the average for the Russian Federation (0.17 per 100 thousand of the population).

West Nile fever was registered for the first time in the region in 2012. The infection was brought in by infected migratory birds; the vectors of the disease are blood-sucking insects. Infection of the population with rabies and tularemia in the region is rarely recorded, but quite often a tense situation arises with the spread of rabies among animals. Foxes are the source of the spread of infection in oblast.

The zoning of the territory is of great importance for taking precautionary measures against cases of disease of the population with natural focal infections. To do this, we ranked 35 municipal divisions of the region according to the sum of the average annual incidence rates of all diseases registered in the division. As a result, zones were identified for different levels of morbidity, which are shown in figure 1.

Areas with a low incidence rate were included in the first zone. Here, cases of natural focal infections are recorded sporadically or are not recorded at all. Basically, these are areas located in the south of the region in the steppe natural zone. The second zone was made up of areas where cases of the disease are registered annually, and the main natural focal morbidity of HFRS for the region exceeds the average for the region. Areas with high incidence rates entered the third zone. Basically, these are areas located in the northeast of the region, where the incidence of HFRS is many times higher than the average level in the region.

The authors carried out zoning according to the incidence of natural focal infections to assess the territory according to the degree of danger of infection with natural focal infections. According to the incidence of natural focal infections, 5 types of regions were identified out of 15 combinations of different ones found within each of the subjects of the disease. The zoning results are shown in figure 2.
Figure 1. Zoning of Samara region by the incidence of natural focal infections
1 - the sum of indicators does not exceed 10 per 100 thousand population; 2 - the sum of indicators 10-50 per 100 thousand population; 3 - the sum of indicators from 50 and more per 100 thousand population.

Figure 2. Zoning of Samara region by the incidence of natural focal diseases
In a district and cities or towns within the district, the following were registered: 1 - either none or one disease; 2 - two diseases; 3 - three diseases; 4 - four diseases; 5 - five or more diseases.
Diseases: H - hemorrhagic fever with renal syndrome; B - tick-borne viral borreliosis; E - tick-borne viral encephalitis; L - leptospirosis; T - tularemia; F - West Nile fever
Summarizing the data on the zoning of the territory by the level of morbidity and incidence of infections, the following zones can be distinguished: 1) conditionally free from natural focal infections — the southern territory of the region; 2) with a moderate incidence rate and a moderate variety of infections - the western, central territory of the region; 3) a zone with a high incidence rate and a variety of natural focal infections - the northeast of the region.

3.2. Age structure of CHB and CHC morbidity
A significant problem for the health care of the region is the incidence of hepatitis B and C. In 2000, in Samara region, the incidence of hepatitis B was 22.7 per 100 thousand of the population and was 60% higher than the national indicator of 14.2 per 100 thousand of the population. Subsequently, in connection with the introduction of compulsory vaccination since 1996, the incidence in the region began to decline, as in the country as a whole. The situation with hepatitis C is the opposite, if in 2000 the incidence rate in the region was lower than the national level and amounted to 20.2 per 100 thousand population, then by 2016 it increased almost 3 times and amounted to 58 per 100 thousand population. Due to the peculiarities of the virus, there are difficulties with the creation of a vaccine, so the incidence of hepatitis C remains at a high level.

In the late 90s and early 2000s viral hepatitis was mainly common among the younger generation aged 15-19 years. The incidence rate of acute hepatitis B in this age group was 453.1 per 100 thousand population. It is believed that 15-20 years after infection with the virus, the disease becomes chronic in 10% of cases [7]. The age structure of the incidence of chronic hepatitis B (CHB) is shown in figure 3. The main share of morbidity falls on the young able-bodied generation at the age of 30-39 years. The highest incidence rate for this age group was in 2015 and amounted to 26.6 per 100 thousand population. The peak incidence of acute hepatitis B was observed in this age group 15-20 years ago.

The age structure of the incidence of chronic hepatitis C (CHC) is shown in figure 4. Here, too, the main share falls on the young able-bodied population aged 30-39 years. The largest share was in 2014 - 38.9%. The incidence rate in this age group remains high: in 2012 it was 106.6 per 100 thousand of the population, in 2016 - 167.1.
3.3 Relationship between the incidence of CHB and CHC with socio-economic indicators in the region

To analyze the relationship between the incidence rate of CHB and CHC with the level of socio-economic well-being of the region, we singled out municipal divisions into two groups: with a high and low level of development. Divisions with a high level of socio-economic development include those in which the indicators are higher than the agreed criterion, at least for three of the four indicators selected for consideration. Divisions with a low level of socio-economic development include those in which the indicators are lower than the agreed criterion. The thresholds for the agreed criteria are given in the note to table 1.

The average long-term morbidity of the rural population of CHB is 9.9; CHC - 17.5 per 100 thousand population. The incidence of CHB in the urban population is 17.8; CHC - 43.4 per 100 thousand population. Comparing morbidity in divisions with different levels of socio-economic development, it is difficult to draw an unambiguous conclusion. However, we state with confidence that in most administrative and municipal divisions with a high level of development, the incidence rate of CHB is lower than the average long-term indicators, and in most divisions with a low level of development, the rate of CHC is higher.

3.4. Socio-economic damage from the incidence of CHC

The high level of morbidity in the population entails significant economic damage. This damage is much greater than the cost of preventive measures. Socio-economic damage is understood as the cost of treatment and rehabilitation of the patient, as well as losses of the state from the withdrawal of a person from the production of the gross domestic product due to disability or death. Society suffers social losses due to temporary or permanent disability. To calculate the socio-economic damage, we are forced to resort to a number of conventions and assumptions, since we do not have complete information on the number of deaths due to chronic hepatitis C, on the number of sick leaves issued and other necessary information for complete and reliable calculations. All calculations are based on the number of newly reported cases.
Table 1. Incidence rates of CHB and CHC in divisions of Samara region with different levels of socio-economic well-being [8]

| Administrative or municipal division<sup>a</sup> | Volume of food products sold, million rubles per year | Economic indicators<sup>b</sup> | Social indicators<sup>b</sup> | Incidence rates |
|-----------------------------------------------|-----------------------------------------------------|--------------------------------|---------------------|----------------|
|                                               | Retail trade turnover, million rubles per year       | Average monthly salary, rubles | Total living area per person, m² | CHB, rate per 100 thousand population | CHC, rate per 100 thousand population |
| Samara                                        | 116701.4                                            | 144206.2                       | 34636               | 25.8            | 15.7            | 54.8            |
| Togliatti                                     | 75733.3                                            | 62663.2                        | 29593               | 21.1            | 12.7            | 28              |
| Syzran                                        | 10558.5                                            | 9572.3                         | 25146               | 23.8            | 25.6            | 43.5            |
| Novokuibyshevsk                               | 4822.2                                             | 5619.7                         | 33834               | 23.2            | 8.4             | 35.6            |
| Otradny                                       | 2332.2                                             | 2246.5                         | 31778               | 23.9            | 4.6             | 21.5            |
| Zhigulevsk                                    | 1643.9                                             | 1702.6                         | 26155               | 27.1            | 11.1            | 71.8            |
| Kinel-Cherkasky district                       | 1352.7                                             | 1098.5                         | 23199               | 25.5            |                 |                 |
| Neftegorsky district                          | 1173.5                                             | 1190.8                         | 26974               | 21.2            | 32.0            | 35.9            |
| Sergievsky district                           | 1951.9                                             | 1899.1                         | 27040               | 23.7            | 5.8             | 5.16            |
| Stavropol district                            | 3629.3                                             | 4828.3                         | 27033               | 35.3            | 3.5             | 3.72            |

Divisions with high socio-economic indicators<sup>b</sup>

| Divisions with low socio-economic indicators<sup>c</sup> |
|--------------------------------------------------------|
| Oktyabrsk                                              | 626.7                                               | 458.8                           | 25808               | 19.4            | 56.2            | 69.2            |
| Alekseevsky district                                   | 291.3                                               | 264.0                           | 19780               | 28.7            | 8.1             | 20.7            |
| Isaklinsky district                                    | 396.7                                               | 350.7                           | 18707               | 26.7            | 7.2             | 5.3             |
| Privilzhsky district                                   | 827.4                                               | 395.6                           | 19162               | 19.4            | 3.5             | 22.4            |
| Khvorostyansk district                                 | 272.8                                               | 152.9                           | 21049               | 21.9            | 20.2            | 23.3            |

<sup>a</sup> economic and social indicators obtained from the official website of State Statistics.
<sup>b</sup> agreed criteria: the volume of food products sold within the boundaries of the constituent entity during the year in the amount of over 1 billion rubles; retail trade turnover over 1 billion rubles per year; average monthly salary over 25 thousand rubles; total living area over 22 m² for 1 person.
<sup>c</sup> agreed criteria: the volume of food products sold during the year for an amount below 900 million rubles; retail trade turnover is below 500 million rubles per year; the average monthly salary is below 22 thousand rubles; total living space less than 22 m² per person.

Earlier we have calculated the economic costs and social losses in Samara region in 2014 from the incidence of CHC [9]. Here we present the results of these calculations and some formulas by which the calculations were made. So, the share of damage due to permanent (death) or temporary retirement of a person due to illness (temporary disability) from the production of the gross domestic product in the region amounted to more than 50 million rubles, was calculated using the following formula:

$$Q_{sr} = \left(\frac{Q_{trf}}{K_{trf}}\right) \times K_{sr},$$

where $Q_{sr}$ is the amount of damage from the incidence of CHC in Samara region; $Q_{trf}$ is the amount of damage from the incidence of CHC in the Russian Federation; $K_{trf}$ is the number of registered cases of CHC in the Russian Federation; $K_{sr}$ is the number of reported cases of CHC in Samara region.

Calculations of the costs of treating one patient with CHC are based on the general recommendations of physicians. In our country, preference is given to antiviral therapy. When
prescribing treatment, the degree and stage of the disease, the sex and age of the patient, and the predisposition to liver cirrhosis are taken into account. The duration of treatment can be from six months to two years. In our calculation, we conventionally assumed six months. Treatment of CHC is complex, therefore, several drugs are prescribed. Medicines were chosen at random; their cost was taken into account based on the average price in pharmacies in large cities of the region. According to our calculations, the cost of one course of treatment is at least 214,700 rubles. The calculation is made according to the following formula:

\[ P = \left( \frac{L_{ti} \times d_i}{k_i} \times S_i \right) + \left( \frac{L_{tj} \times d_j}{k_j} \times S_j \right) + \ldots \]

where \( P \) is the cost of one course of treatment; \( L_i \) is the number of required tablets of one drug per day; \( d \) is number of days of taking the drug; \( k \) is number of tablets in a package; \( S \) is the cost of one package of the drug; \( i, j, \ldots \) is name of the drug.

Multiplying the amount received by the number of newly registered cases of CHC (1,672 people) in the region in 2014, we get a rather impressive amount - 358,978,400 rubles. And this is only for the minimum course of treatment, excluding the cost of rehabilitation.

The regional budget bears a tangible burden from social payments for temporary and permanent disability. Based on the average salary in 2014, using the standard calculation for sick leave payment, the cost of one working day was 909 rubles. Disability benefits payments (for example, the calculation was made for the 2nd group of disability) in 2014 per person per year amounted to 72,411 rubles. The number of payments for each disability group is set by the state annually.

The calculation of the economic losses of the region from the retirement of one person from the process of the domestic regional product was made by dividing the volume of the gross regional product produced in Samara region in 2014 by the number of the able-bodied population, and amounted to 586.8 thousand rubles. Knowing the number of cases of disability, the number of deaths due to CHC disease, knowing the sex and age of each case, we can calculate the total economic damage. According to our approximate calculations, one case of chronic hepatitis C disease with severe consequences entails significant costs on the part of the state, the patient himself and society as a whole. To calculate the total socioeconomic damage, it is necessary to have detailed information about each case of the disease. To do this, it is necessary to maintain a register that reflects full information about the patient, the stage of the disease, the course of treatment and the status after the disease.

3.5. The relationship between tuberculosis incidence and socio-economic well-being

The incidence of tuberculosis is an equally urgent problem in Samara region. Over the past 10 years, in 2013, there was a peak in the incidence (76.64 per 100 thousand population). In subsequent years, this indicator declines in the same way as in the country as a whole, but still remains 8% higher than the average for Russia.

We conducted a multivariate cluster analysis to identify the relationship between the incidence of tuberculosis and the level of socio-economic development of the region. As a result of the analysis, we identified 4 classes of administrative and municipal divisions: with a high incidence rate and low socio-economic conditions; with relatively low incidence and high rates of development; and two separate classes with different performance levels. The result is presented in table 2.
Environmental Problems of Large River Basins -7

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Table 2. Categories of municipal divisions of Samara region by level of socio-economic development and incidence of tuberculosis

| Municipal divisions     | Average monthly wage (thousand rubles) | Volume of food products sold within the subject per year per capita (thousand rubles) | Retail turnover per year per capita (thousand rubles) | Total living space per person (m²) | Active forms of tuberculosis (person per 100 thousand population) |
|-------------------------|----------------------------------------|--------------------------------------------------------------------------------------|-----------------------------------------------------|----------------------------------|-----------------------------------------------------------------|
| **Divisions with low socio-economic indicators and high morbidity rates** |                                        |                                                                                     |                                                     |                                  |                                                                |
| Bolsheglushitsky        | 22.7                                   | 28.0                                                                                 | 29.3                                                | 25.1                             | 89.5                                                            |
| Bolshechernigovsky      | 21.3                                   | 32.8                                                                                 | 33.4                                                | 26.6                             | 94.7                                                            |
| Isaklinsky              | 18.7                                   | 30.9                                                                                 | 28.2                                                | 27.4                             | 69.2                                                            |
| Kinelsky                | 29.1                                   | 28.3                                                                                 | 34.2                                                | 25.2                             | 71.9                                                            |
| Kinel-Cherkassky         | 23.2                                   | 29.9                                                                                 | 25.7                                                | 25.8                             | 80.1                                                            |
| Klyavlinskyy            | 20.5                                   | 29.0                                                                                 | 19.9                                                | 24.6                             | 57.1                                                            |
| Zhigulevsk              | 26.2                                   | 27.6                                                                                 | 30.9                                                | 27.3                             | 75.3                                                            |
| Petravsky               | 21.1                                   | 23.4                                                                                 | 21.7                                                | 24.5                             | 72.0                                                            |
| Pohvistnevsky           | 22.3                                   | 27.6                                                                                 | 22.5                                                | 22.2                             | 71.2                                                            |
| Privolzhsky             | 19.2                                   | 35.1                                                                                 | 18.8                                                | 19.5                             | 87.9                                                            |
| Oktyabrsk               | 25.8                                   | 23.5                                                                                 | 18.0                                                | 19.8                             | 84.7                                                            |
| Khvorostyansky          | 21.0                                   | 17.1                                                                                 | 9.6                                                 | 22.0                             | 68.5                                                            |
| Chelno-Vershinsky       | 20.1                                   | 24.4                                                                                 | 15.4                                                | 29.4                             | 68.6                                                            |
| Shentalsinsky           | 20.5                                   | 29.9                                                                                 | 23.1                                                | 26.0                             | 69.3                                                            |
| **Divisions with high socio-economic indicators and low and medium incidence** |                                        |                                                                                     |                                                     |                                  |                                                                |
| Samara                  | 34.6                                   | 99.6                                                                                 | 124.3                                               | 26.2                             | 67.5                                                            |
| Togliatti               | 29.6                                   | 105.8                                                                                | 89.8                                                | 21.3                             | 50.2                                                            |
| **Divisions with high and medium socio-economic indicators and different levels of morbidity** |                                        |                                                                                     |                                                     |                                  |                                                                |
| Neftegorsk              | 27.0                                   | 34.8                                                                                 | 37.5                                                | 21.3                             | 48.1                                                            |
| Novokuibyshevsk         | 33.8                                   | 45.1                                                                                 | 55.4                                                | 23.4                             | 50.0                                                            |
| Otradnuy               | 31.8                                   | 49.1                                                                                 | 49.6                                                | 24.0                             | 51.6                                                            |
| Syzran                  | 25.1                                   | 60.0                                                                                 | 57.6                                                | 24.1                             | 52.4                                                            |
| Syzransky               | 22.3                                   | 22.2                                                                                 | 30.7                                                | 22.0                             | 61.5                                                            |
| Borsky                  | 19.8                                   | 74.2                                                                                 | 23.5                                                | 26.1                             | 62.8                                                            |
| Volzhsky                | 28.5                                   | 37.9                                                                                 | 44.9                                                | 23.2                             | 60.6                                                            |
| Kamyshtinsky            | 20.3                                   | 25.9                                                                                 | 38.8                                                | 24.2                             | 62.8                                                            |
| Sergievsky             | 27.0                                   | 42.5                                                                                 | 43.9                                                | 23.9                             | 63.3                                                            |
| Bezechukovsky           | 24.2                                   | 46.0                                                                                 | 56.7                                                | 23.5                             | 76.3                                                            |
| Bogatovsky             | 24.4                                   | 44.1                                                                                 | 36.7                                                | 27.8                             | 69.5                                                            |
| Stavropolansky          | 27.0                                   | 54.8                                                                                 | 70.0                                                | 36.2                             | 75.6                                                            |
| Shigonsky               | 19.3                                   | 25.0                                                                                 | 31.5                                                | 28.5                             | 77.3                                                            |
| Koskhiinsky             | 22.4                                   | 46.5                                                                                 | 54.5                                                | 24.6                             | 99.2                                                            |
| Chapayevsk              | 22.7                                   | 39.8                                                                                 | 43.2                                                | 22.1                             | 92.3                                                            |
| **Divisions with low and medium socio-economic indicators and different levels of morbidity** |                                        |                                                                                     |                                                     |                                  |                                                                |
| Alekseevsky             | 19.8                                   | 25.0                                                                                 | 23.6                                                | 28.8                             | 55.6                                                            |
| Elkhovskyy              | 22.8                                   | 28.1                                                                                 | 16.2                                                | 23.5                             | 111.3                                                           |
| Krasnoarmeyssky         | 21.4                                   | 25.7                                                                                 | 25.1                                                | 26.3                             | 85.4                                                            |
| Krasnoyarsky            | 23.3                                   | 42.5                                                                                 | 65.4                                                | 27.9                             | 69.1                                                            |
| **Average for Samara region** | **24.1**                                   | **38.3**                                                                               | **38.0**                                             | **24.9**                          | **63.9**                                                        |

4. Conclusion
Territory zoning is important when health authorities take measures to prevent the spread of natural focal diseases. Having summarized the zoning of the territory of Samara region by the level of
morbidity and incidence of natural focal infections, we can distinguish three zones: 1) conditionally free from natural focal infections — the southern territories of the region; 2) a zone with a moderate incidence rate and a moderate variety of infections - the western and central territories of the region; 3) a zone with a high incidence rate and a variety of natural focal infections - the northeast of the region. The morbidity of the population with chronic hepatitis B and C creates an acute problem for the health care of the region. The young able-bodied population aged 30-39 years is the main share in the age structure of morbidity. We cannot make an unambiguous conclusion about the influence of the indicators of the socio-economic development of divisions on the incidence rate of CHB and CHC, but these diseases themselves cause significant socio-economic damage. The regional, state budget and society as a whole bear significant costs and social losses from these diseases. According to our largely simplified and underestimated calculation for 2014:
• the regional budget loses about 50 million rubles;
• the minimum course of treatment for 1 person requires 214,700 rubles;
• 1 day of temporary disability, on average, per 1 person costs 909 rubles;
• social benefits for permanent disability of 1 person per year cost 72,411 rubles;
• from the withdrawal of 1 person from the production of the gross regional product, the damage amounts to 586,800 rubles.

An example of calculating the socio-economic damage from the incidence of CHC showed that for a complete assessment of the damage, it is required to keep records of each case of the disease. It is necessary to create a unified federal register, which should reflect complete information about the patient, the course of treatment, the prognosis for recovery, etc. A clear assessment and full understanding of the severity of the consequences of each case will allow taking effective measures to combat these diseases.

The result of a study of the relationship between the incidence of tuberculosis and socio-economic indicators in the region showed that the increase in incidence in Samara region is associated with a low level of well-being of the population. In 17 out of 23 administrative and municipal divisions with a high incidence, wages are below the regional average. The performed correlation analysis showed a statistically significant relationship (p <0.05) between the incidence and the level of the average monthly salary.

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