The Influence of Environmental Predictors on the Correlation Dependence of Population Morbidity

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Abstract. In this article, the authors consider environmental risk factors on direct dependence of the population morbidity of the industrial region in the Russian Federation. In terms of concept of sustainable development, the evaluation of the conditions of health and life quality is made through a set of relevant indices and indicators. The authors analyze health conditions, morbidity and mortality using statistical reporting data. The paper evaluates the condition of health and the population life quality in a comparative aspect by year and region, based on the available data of the statistical reports of the constituent entities of the Russian Federation. These factors directly or indirectly reflect the conditions of the environment, life quality, including the level of socio-economic development. As an integral evaluation, we are developing methods to reduce the impact of harmful factors on public health. As a result, we have the evaluation with subsequent ranking, according to which the strategy for further development is elaborated.

Keywords: environmental factors, health, morbidity, mortality.

1 Introduction

The increasing pace of change in the habitat results in breaking the communications between the habitat and a human, reducing the adaptive capacity of the organism. The habitat may contain such substances that the organism has not come across in the course of evolution and therefore does not have appropriate analyzer systems that signal about their availability.

Deep changes in the biosphere occur more rapidly than the pace of evolution of living organisms. Therefore, there can be imbalance in the mechanism of interactions of the environment and the organism, which has been over thousands of years, which is associated with the nature and level of the protective functions of the last one [1].

2 Problem Statement

The Samara region is one of the highly urbanized regions, with a steady trend towards the development of new territories and zonal resettlement of the population, and is included into 13 regions of Russia with an unfavorable environmental situation: the level of air, water and soil pollution in all major cities of the Samara region exceeds the average pollution in Russia. The problem of production-dependent effects on humans, including dioxin pollution, etc., is also relevant for the region (Togliatti, Chapaevsk, Novokuibyshevsk, Otradny, Pokhvistnevo, etc.).

As a result, the health quality of children, adolescents, women and men of reproductive age, older people decreases, the duration and life quality decrease, the morbidity, disability and mortality of the population increase.

3 Research Questions

At present, the organization of the information system “population health - environment” (PH - E) is of primary importance, for which data are collected through state statistical reporting. The task of the state information system PH-E is to collect data on environmental pollution and the condition of public health.

According to the literature, under certain circumstances and concentrations of controlled chemicals in ambient air can influence the formation of the following interrelations: “suspended substances, nitrogen dioxide, benzo (a) pyrene → respiratory diseases”, “benzene and its derivatives, aromatic hydrocarbons, dioxide nitrogen → diseases of blood and blood-forming organs"; “Amino and nitro derivatives of benzene, hydrogen sulfide, formaldehyde, suspended substances disturbances involving the immune system → circulatory system diseases”; "Benzene → circulatory system diseases"; "Formaldehyde, hydrogen sulfide, aromatic hydrocarbons - skin diseases"; “Carbon monoxide and carbon dioxide, aromatics, hydrogen sulfide, phenol → diseases of the central and vegetative nervous system”; "benzene, ethylbenzene → digestive organs", " carbon monoxide → endocrine system "; "ethylene, butylene, carbon disulfide, hydrocarbon, oxides of sulfur, carbon dioxide, hydrogen sulfide, carbon monoxide → diseases of the genitourinary system"; “polycyclic aromatic hydrocarbons (PAHs), including benzo (a) pyrene → malignant neoplasms"; “carcinogens, acrolein and other photooxidants (nitrogen oxides, ozone, organic formaldehyde peroxides, organic

peroxides) → neoplasms of the digestive organs; “ethylene, butylene, carbon disulfide, hydrocarbon, oxides of sulfur, carbon dioxide, hydrogen sulfide, carbon monoxide → urinary tract neoplasms”.

Diseases of infectious and non-infectious etiology are associated with water factor: ecologically caused by natural and anthropogenic origin, as well as ecologically dependent pathology [2-4].

4 Purpose of the Study

The aim of the research is to study the dynamics of morbidity and mortality, based on a set of indicators of environmental risk factors.

Hypothesis of scientific research: the possibility of dynamic development with the integration of predictors of external environment on the correlation dependence of population morbidity is provided on the condition of the transition of civilizational development to the path of environmental modernization and security.

5 Research Methods

The main methodological principles applied in the research: systemasity; unity of theory and practice; the principle "from abstract to certain"; activity in full structure of a scientific subject, from problems to objectives, from empirical material to theoretical provisions; configuration of various knowledge types.

These methods contributed to the achievement of the goal.

6 Findings

The overall incidence rates for the entire population are higher than the average for the federal districts of the Russian Federation (Fig. 1) [5].

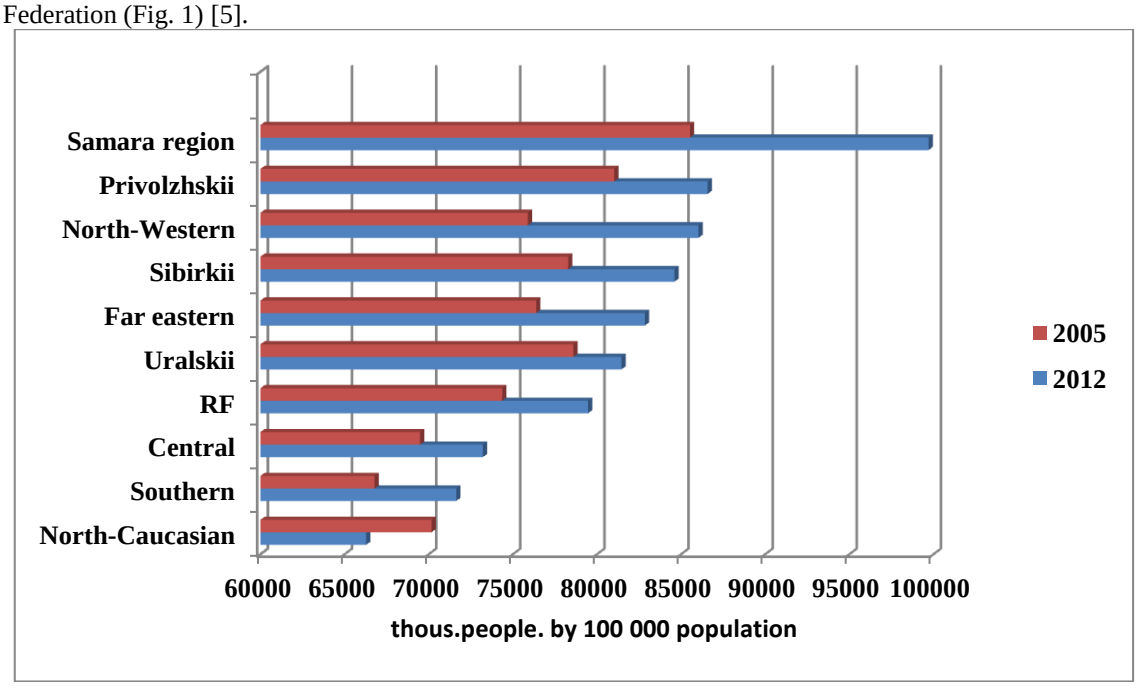

Figure 1. The overall morbidity of the entire population (first registered)
(Source: compiled by the authors)

Based on the data presented, an increase in the level of registered morbidity from 2005 to 2012 is observed. In just 8 years, the figures increased by 16.6%.

In 2012, compared with 2011-2010, there was an increase in average concentrations: in bread and bread products - lead, mercury, DDT; in vegetables and melons - mercury and arsenic; in meat and meat products - lead, mercury, DDT; in milk and dairy products - arsenic; in fish and fish products - mercury; in sugar and confectionery - mercury; in vegetable oil and other fats - lead, DDT [5].

Arsenic, lead and cadmium have cumulative properties, leading food contaminants. As the total contribution of these contaminants increases, their hazard ratio and the risk to organs and systems of the human body increase according to the proportion.

The expected number of cases of malignant neoplasms for the entire upcoming life of the examined population of a certain number at the constant exposure level and the number of the population will be 20 cases per 10,000 of the total population [6].

In the structure of mortality of the entire population in 2012, circulatory system diseases accounted 51%; neoplasms - 15%; accidents, injuries and intoxications - 12%; other reasons - 11%; digestive system diseases - 5%; respiratory diseases, infectious and parasitic diseases - 3% each (Fig.2) [8].

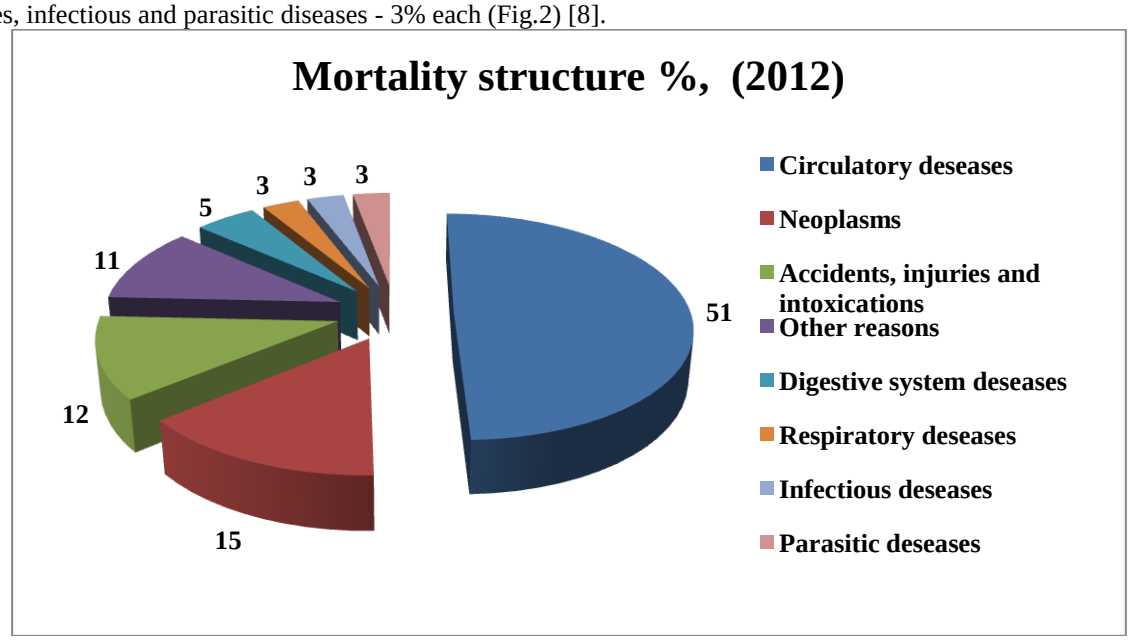

Figure 2. Mortality structure (Source: compiled by the authors)

For the entire population of the Samara region, over 10 years, an increase in the overall incidence was recorded annually (F.12 “Report on the number of diseases registered in patients living in the service area of a medical institution”), according to prevalence and newly revealed.

In the structure of the overall morbidity of the entire population (calculations per 100 thousand of the total population) in 2012 (Fig. 3), the prevalence was in respiratory diseases (23%); circulatory system diseases (15%); diseases of the musculoskeletal system (11%); diseases of the genitourinary system (9%); ocular diseases (7%); injuries and intoxications (5%), etc.; first-time incidence (Fig. 2) - respiratory diseases in 2012 were 44%; injuries, intoxications - 11%; diseases of the genitourinary system - 8%; skin and subcutaneous tissue diseases - 6%; diseases of the ear and mastoid process, diseases of the digestive organs, diseases of the musculoskeletal system - 4% each, etc. [7].

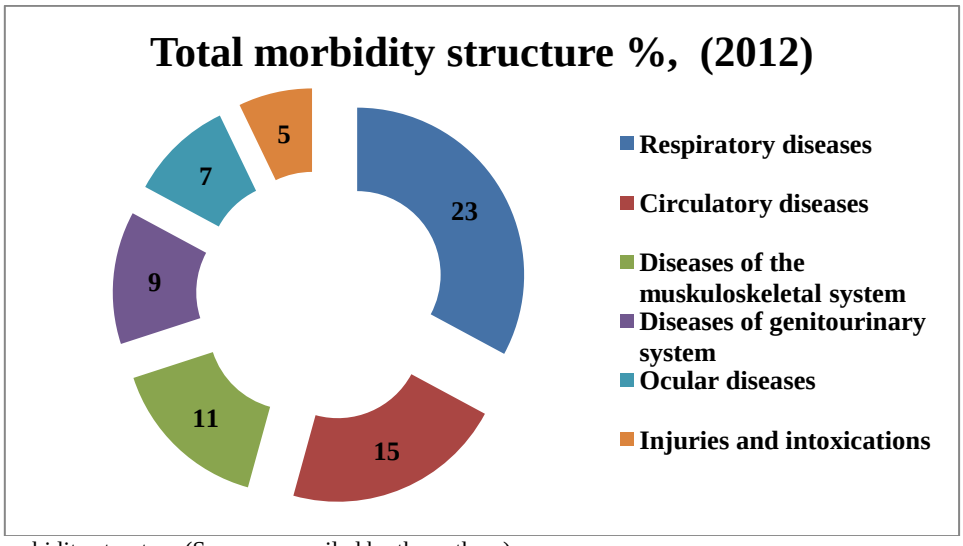

Figure 3. Total morbidity structure (Source: compiled by the authors)

In the Samara region for several years, there has been an increase in congenital developmental anomalies in the children's population. In 2012, compared with 2003, the incidence of congenital anomalies increased by 1.8 times.

Congenital anomalies are an indicator of habitat quality and genetic health of the population. The reasons for the development of congenital anomalies are anthropotechnogenic factors (environmental pollution - exceeding the hygienic standards of harmful chemicals in atmospheric air, drinking water, food, etc., noise exposure, electromagnetic

fields, etc.), socio-demographic factors (maternal age, parity), medical genetic factors (medical abortions, heredity tainted, mother' chronic diseases, infections during pregnancy) [2, 8].

The most interesting is the fact that the woman's body during pregnancy not only does not protect the fetus from harmful environmental influences, but in most cases it itself causes pathological processes in a developing child. It causes prenatal pathology, the birth of disabled generation and intensive disability of the children's population in the region. In the structure of perinatal mortality, the proportion of congenital anomalies is constantly growing (26.2%), which take the second place in the field of respiratory disorders syndrome.

There is a positive trend towards relative and absolute growth of genetic pathology. Thus, there is a clear deterioration of the nation's gene pool as a result of increased mutagenesis. Consequently, the influence of the ecological situation on the reproductive function and population's health appears to escalate from crisis to catastrophic, which is underestimated by the population in general and politicians in particular. There is an obvious necessity for an environmentally oriented search for adequate methods of predicting and preventing reproductive disorders as an indicator of the condition of population's health for residents of the Samara Region.

7 Conclusion

On the basis of the estimates obtained, it can be concluded that the subjects of the Russian Federation have every chance to preserve the health of the nation, while maintaining a high level of well-being of its inhabitants and the development of human capital. Consequently, the dynamic development of the region, as a priority strategy for the development of society, will ensure the preservation of the environment for both current and future generations, while guaranteeing a high economic standard of living and social security of citizens.

According to the Federal Law "On Sanitary and Epidemiological Well-Being of the Population" and regarding taking measures to eliminate the harmful effects of human environmental factors on the population, it is necessary to implement measures aimed at improving the population's health and human environment on the condition that there are no harmful effects of environmental factors on a person and providing that there are favorable life conditions.

The regional programs on sanitary and epidemiological well-being of the population should be implemented as well as the claims for compensation for damage to the human environment caused as a result of RF legislation violation should be applied.

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