

## Assessment and Forecasting of the Impact of Negative Environmental Factors on Public Health

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**Abstract :** Introduction. Adverse environmental factors do not immediately lead to pathological changes in the body. They can exert the growth of pre-pathology characterized by shifts in physiological, biochemical, immunological and other indicators of the body state. These disorders are unstable, reversible and indicative of body reactions. There is an opportunity to objectively judge the internal structure of the adaptive body reactions at the level of individual organs and systems. In order to obtain a stable response of the body to the chronic effects of unfavorable environmental factors of low intensity (compared to production environment factors), a time called the «lag time» is needed. The obtained results without considering this factor distort reality and, for the most part, cannot be a reliable statement of the main conclusions in any work. A technique is needed to reduce methodological errors and combine mathematical logic using statistical methods and a medical point of view, which ultimately will affect the obtained results and avoid a false correlation. Objective. Development of a methodology for assessing and predicting the environmental factors impact on the population health considering the «lag time.» Methods. Research objects: environmental and population morbidity indicators. The database on the environmental state was compiled from the monthly newsletters of Kazhydromet. Data on population morbidity were obtained from regional statistical yearbooks. When processing static data, a time interval (lag) was determined for each «argument-function» pair. That is the required interval, after which the harmful factor effect (argument) will fully manifest itself in the indicators of the organism's state (function). The lag value was determined by cross-correlation functions of arguments (environmental indicators) with functions (morbidity). Correlation coefficients (r) and their reliability (t), Fisher's criterion (F) and the influence share (R<sup>2</sup>) of the main factor (argument) per indicator (function) were calculated as a percentage. Results. The ecological situation of an industrially developed region has an impact on health indicators, but it has some nuances. Fundamentally opposite results were obtained in the mathematical data processing, considering the «lag time». Namely, an expressed correlation was revealed after two databases (ecology-morbidity) shifted. For example, the lag period was 4 years for dust concentration, general morbidity, and 3 years - for childhood morbidity. These periods accounted for the maximum values of the correlation coefficients and the largest percentage of the influencing factor. Similar results were observed in relation to the concentration of soot, dioxide, etc. The comprehensive statistical processing using multiple correlation-regression variance analysis confirms the correctness of the above statement. This method provided the integrated approach to predicting the degree of pollution of the main environmental components to identify the most dangerous combinations of concentrations of leading negative environmental factors. Conclusion. The method of assessing the «environment-public health» system (considering the «lag time») is qualitatively different from the traditional (without considering the «lag time»). The results significantly differ and are more amenable to a logical explanation of the obtained dependencies. The method allows presenting the quantitative and qualitative dependence in a different way within the «environment-public health» system.

**Keywords :** ecology, morbidity, population, lag time

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