

## METHOD OF NESTED LINEAR CONVOLUTIONS FOR ESTIMATING THE POPULATION'S HEALTH QUALITY

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For the purpose of estimating the population's health in the process of mass screening investigations we used a computer-aided system intended for quantitative estimation of risks of main pathological syndromes (CASQERS) on the basis of anonymous sociological inquiry. It allows one to measure the risk of pathology. The CASQERS is grounded on application of the Bayes algorithm needed for estimating the results of inquiry via complaints, anamnesis, genetic and psychological data, peculiarities of labor, mode of life, nourishment, and via such objective criteria as age, frequency of systoles, arterial pressure, mass and length of body. The CASQERS questionnaire includes 110 statements proposed to the respondents to be chosen. It allows to obtain the conclusion on the quantitative measure of risk of the most widely spread general pathology syndromes (WSGPS): arterial hypertension, cardial ischemia, disorders of the gastro-intestinal system's functional state; of liver, respiratory organs, urinal system; endocrinological, allergological, neurological disorders, boundary nervous disorders and alcohol dependence (Yu.Gichev, 1990).

To the estimation of the quality of population's health we propose to use integrated criteria, whose main intention is to give a complex estimate of multiplicity and frequency of WSGPS. From the mathematical viewpoint, constructing of integrated criteria belongs to the problems of multi-criterion analysis of hierarchies, which can be solved by decomposition of the main characteristics of health quality and the account of their importance by weighting coefficients determined by expert methods. To take account of the latter, a 10-digit scale has been introduced. The more important is the characteristic of health quality the larger weighting coefficient is attributed to it. The health quality is estimated by a vector criterion, which can be transformed into the scalar form by the method of nested linear convolutions. Mathematical models of health quality are represented by graphs-trees, one of which allows to take account of the multiplicity and the other – frequency of WSGPS in the integrated estimate of health quality. The multiple convolution of the two integrated estimates of health

quality, which is obtained with the use of above two graphs, is the generalized criterion of health quality. The problem of possibility and the degree of problem's formalization is discussed, and the semantic content of the integrated criteria is defined. The technique of gradation of health quality by scaling the values of integrated criteria (rated within 0 to 1) is proposed and grounded. The higher is value, the better is the health quality.

Development of northern territories of East Siberia in connection with prospecting and exploitation of high-capacity natural gas field is dependent not only on the investments, but on the availability of skilled employees capable to work in severe conditions of life and labor. Conditions of intensive, heavy and hazardous labor on the gas deposit and on the enterprises processing gas impose high requirements to the employees' health state. This makes the problem of estimating the health quality – as the component of the native employees' labor potential – quite essential. The method proposed allows experts to estimate health quality of the population on the territory of the deposit.

It is expedient to notice in conclusion that the approach proposed can form the methodological basis for estimating the population's health quality. Such a basis is needed for development and application of a system of social-hygienic monitoring of the population's health. It includes the following sequential stages: collection and processing the information, decomposition and construction of graph-trees for the chosen characteristics of health quality, determination of the weighting coefficients, computation of the integrated criteria, scaling the gradations of health quality, obtaining grounded conclusions needed for making management decisions on improving the state of population's health.