



## **Climate change and malaria risk in the European part of Russia in 21st century**

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The purpose of this research is development of prognostic model of malaria risk for European part of Russia (EPR) in the 21st century according to climate scenario IPCC "A2".

The following issues have been formulated to reach the goal of the research:

define the basic epidemiological parameters describing malaria situation and methods of data processing;

creating of maps of malaria risk;

analysis of changes in malaria distribution for predictable future climate conditions in comparison with conditions of a modern climate.

A lot of reasons (biological, social and economic) impact on malaria distribution. Nevertheless, incubation period of the parasite first of all depends on temperature. This is a primary factor that defines a potential area of infection, ability and specificity to transmit malaria. According to this, the model is based on the relationship between climate (average daily temperature) and the intensity of malaria transmission.

The object of research is malaria parasite *Plasmodium vivax*, which has for Russia (particularly for EPR) the greatest importance because it has the lowest minimal temperature threshold for development.

Climate data is presented by daily average temperatures of air for three analyzed periods. 1961 -1989 describes a modern climate and corresponds to the minimum 30-year period that is necessary for an assessment of climate and changes connected with biotic components. Prognostic malaria model is based on predicted daily average temperatures for 2046-2065 (the middle of century) and 2089-2100 (the end of century). All data sets for EPR are presented in the grid 2x2.

The conclusion on possible changes in malaria distribution and transmission in the middle and the end of the 21st century:

There is going to be the increase of duration of effective temperatures period (period when parasite development is possible), period of effective susceptibility to infection of mosquitoes (period when malaria transmission cycle is possible); shift of the beginning of malaria transmission period to earlier time as well as the end of this period's shift to later time is connected to increase of effective temperatures annual sum.

Northern bounds of the territory where temperature conditions allow parasite's development and disease transmission are going to move significantly to the north. Accordingly there will be an expansion of potential disease distribution area. Annual development of parasite and malaria transmission will probably be possible on nearly whole EPR. The probability of malaria transmission and its intensity will increase. The greatest changes in malaria situation will occur in the north of EPR.

The results of the research indicate growth of malaria risk on whole European part of Russia in 21st century.