



# Estimation of vulnerability and health adaptation of the population to climate changes in the Arkhangelsk region, Northwest Russia: the WHO project



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## Background

It is known, change of a climate influences significantly on the population health in the different territories of the world (WHO, 2005). Global climate models predict stronger effect of warming on all Arctic zone in comparison with any others territories of Northern hemisphere.

In the international studies are considered following health outcomes: morbidity and mortality from heat and heat-waves, air pollution, floods, windstorms and food insecurity; vector-borne diseases; waterborne and foodborne diarrheal diseases; and adverse health outcomes associated with stratospheric ozone depletion.



## Territory

The Arkhangelsk region is located in the north of the European part of Russia, is a part of the Northwest federal district. The area coast is washed by three seas: White, Barents and Karsky. The territory is 587 thousand square km (figure 1).

The population of the Arkhangelsk region is 1,3 million people, population density - 2,2 persons on 1 km<sup>2</sup>, 75% live in urban areas. The region includes 229 municipal territories: 7 city districts, 19 municipal areas, 24 urban and 179 rural areas. The Arkhangelsk region is known for its forestry, fishing industry and modern shipbuilding.

There are frequent changes of the air mass leading to instability of the weather. Absence of mountain ridges makes this territory readily available for cyclones from Atlantic and streams of cold Arctic air from the northeast. The cyclones from Atlantic bring precipitations, cloudy weather, in the winter - the warming, the streams of cold Arctic air cause strong decreases in temperatures and frosts.



Figure 1. Map of the Barents Euro-Arctic region.  
Resource: <http://www.barentsinfo.fi/barentsmap.htm>

## Project

**“Estimation of vulnerability and health adaptation of the population to climate changes in the Arkhangelsk region”**  
Period of the project: from January, 01st 2009 - to December, 31st 2010.

This project according to WHO recommendations includes following tasks: i) estimation of the climate changes, ii) estimation of the population health in connection with climate changes, iii) estimation of undertaken measures and development of contemporary actions on prevention and decrease the influence of climatic changes on the population health, iv) estimation of health care system availability to the given changes and its optimization.

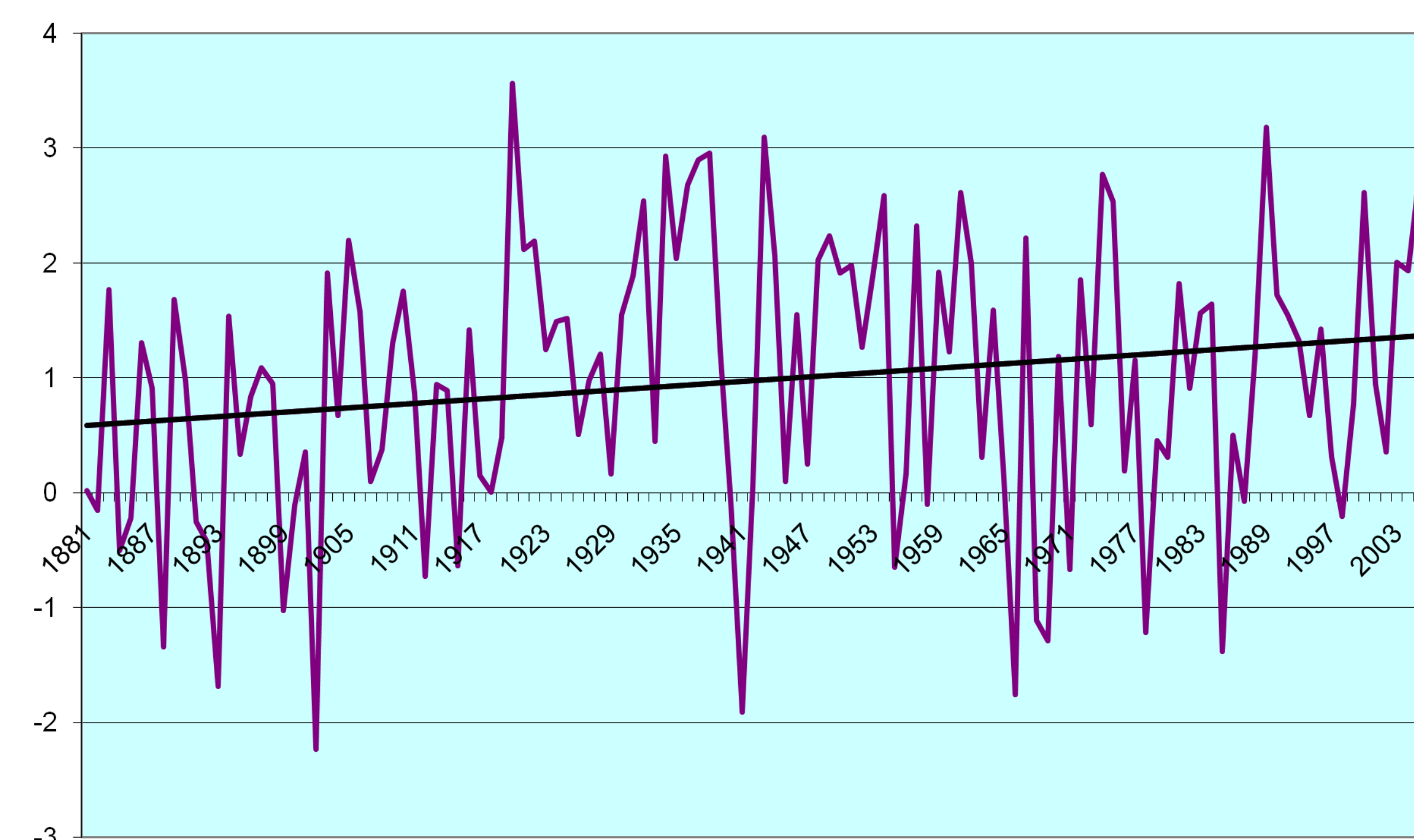


Figure 2. Monthly average temperature in the Arkhangelsk, 1881-2007.

Warming in the Northwest Russia is not identical in time and in territory, and sizes of trends essentially depend on a season. Warming took place, basically, in a cold half of year whereas in warm half-year there was some cold snap. Warming during winter time in the south of the Arkhangelsk region is especially appreciable.

## Aim of the project

To protect population health from negative consequences of climate change in the Northwest Russia.

## Methods

**Study period – 1999-2008.**

**Time serious analysis.**

**Meteorological daily data:**

- maximum and minimum, average temperature
- humidity
- atmospheric pressure
- wind speed
- precipitation
- cloudiness in summer months
- ozone layer.

## Working groups

- 1) *Climate change effect on mortality in the Arkhangelsk.*
  - All causes (excluding external reasons)
  - Diseases of the circulatory system (ICD: 100-199)
  - Respiratory mortality (ICD: J00-J99)
  - Diseases of the genitourinary system (ICD: N00-N99)

- Endocrine diseases (ICD: E10-E14)
  - 2) *Climate and sensitive to climate non-communicable diseases (Arkhangelsk, Novodvinsk).*
  - Diseases of the circulatory system (ICD: 100-199)
  - Respiratory mortality (ICD: J00-J99)
  - Diseases of the genitourinary system (ICD: N00-N99)
  - Endocrine diseases (ICD: E10-E14)
- Air-pollution concentrations: suspended matters, carbon monoxide, nitrogen dioxide, hydrogen sulfide, carbon bisulphide.
- 3) *Climate change effect on tick-borne encephalitis.*

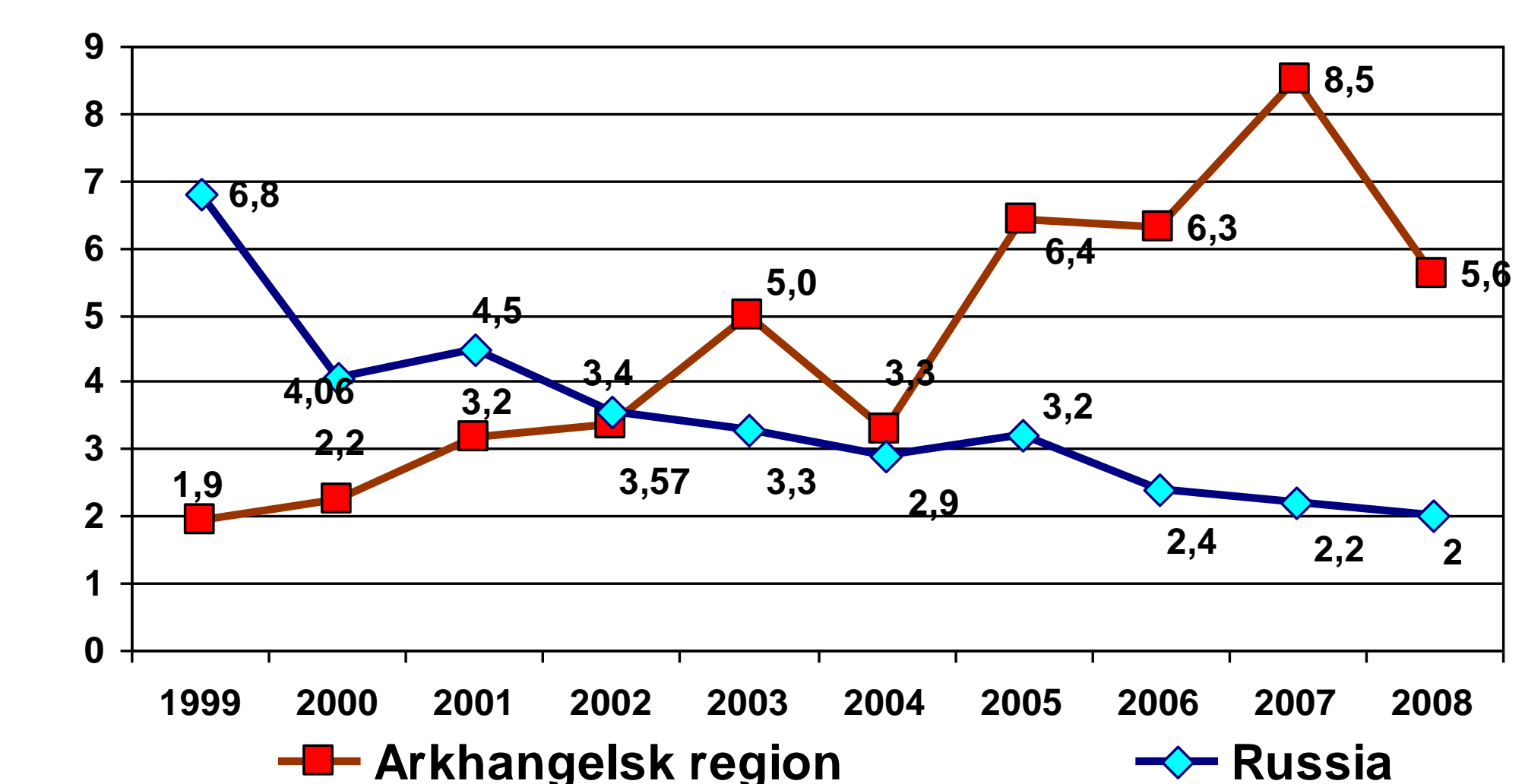


Figure 3. Tick-borne encephalitis morbidity in the Russia, Arkhangelsk region, 1999-2008.

4) *Climate change effect on communicable intestinal (water and food) diseases and helminthiasises.*

- Shigellosis (ICD: A03)
- Salmonellosis (ICD: A03)
- Rotaviral intestinal infections (ICD: A08)
- 5) *Climate change and ozone depletion effect on cancer.*
- Malignant melanoma of skin (ICD: C43)
- Basal cell carcinoma of skin (ICD: C44)
- Squamous cell carcinoma of skin (ICD: C44)

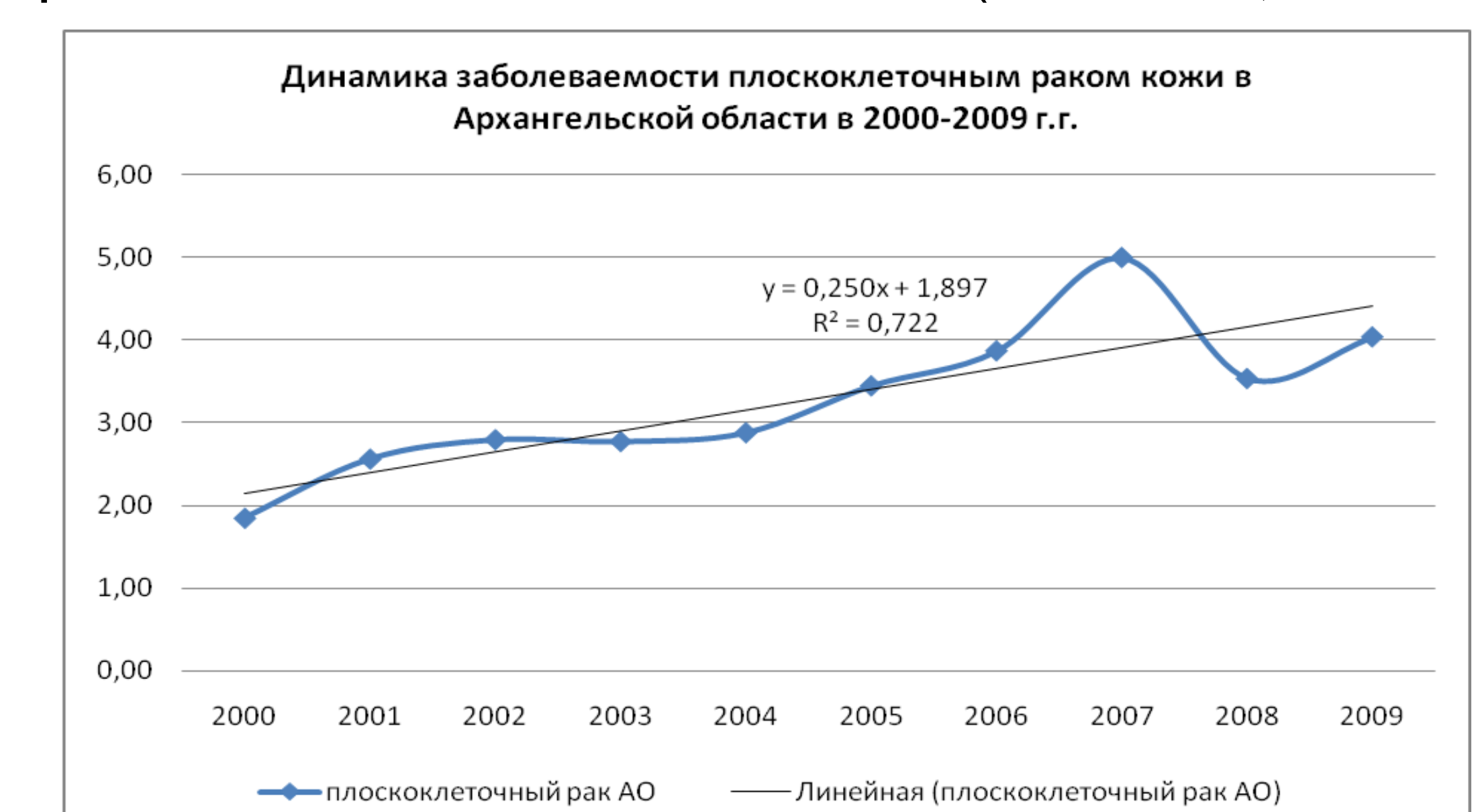


Figure 4. Incidence of Squamous cell carcinoma of skin in the Arkhangelsk region, 2000-2009.

6) *Climate change and its effect on the population in the Nenets Autonomous region.*

