



GOVERNMENT OF THE
REPUBLIC OF MACEDONIA
MINISTRY OF ENVIRONMENT
AND PHYSICAL PLANNING

THIRD NATIONAL COMMUNICATION ON CLIMATE CHANGE



HEALTH AND CLIMATE CHANGE

VULNERABILITY ASSESSMENT AND ADAPTATION MEASURES



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HUMAN HEALTH AND THE IMPACTS OF CLIMATE CHANGE

This publication summarizes key findings from an assessment of the vulnerability of health sector to climate change and possible adaptation measures and strategies.

This assessment was made as part of the Republic of Macedonia's Third National Communication on Climate Change to the United Nations Framework Convention on Climate Change by the Ministry of Environment and Physical Planning with support from the United Nations Development Programme (UNDP) and the Global Environment Facility (GEF).

The full report is available at:
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Human populations are vulnerable to both the direct and indirect impacts of climate change in a number of complex ways. And while climate change will have consequences for human health on a global scale, the severity of these consequences will differ according to region and the capacity of populations to prepare for, cope with and recover from both the direct effects, such as increasing temperatures and an increase in heatwaves, droughts, floods and fires, and the indirect effects, such as shifts in the patterns of disease vectors, crop failures, water scarcity and population displacement.

Assessing the vulnerability of populations to the impacts of climate change on health is a vital first step towards increasing their resilience to these impacts. Such assessment should serve to identify the most vulnerable people in the local population, identify any major weaknesses in the health infrastructure—including disparities in access to healthcare services—and any deficiencies in regional disaster preparedness. Vulnerability assessments can inform governments as to the best strategies to be taken to improve the population's resilience.







HEALTH AND THE CHALLENGE OF CLIMATE CHANGE IN THE COUNTRY'S THIRD NATIONAL COMMUNICATION TO THE UN FRAMEWORK CONVENTION ON CLIMATE CHANGE

As part of its commitment to support sustainable development and to help mitigate and adapt to the impacts of climate change, the Ministry of Environment and Physical Planning, with UNDP's support, developed the First, Second and Third National Communications to the UN Framework Convention on Climate Change. For the Third National Communication, multi-sectoral analysis included a special vulnerability assessment of the impacts of climate change on human health in the South-East Region. This Region was chosen because it has been identified in previous communications as amongst the regions most vulnerable regions in the country to climate change.



Amongst the key questions the Third National Communication set out to address were:

- What diseases in the region are sensitive to the predicted climate changes in the region, including changes in temperature and precipitation?
- Which populations are exposed to climate-related diseases?
- What are the risk factors/health determinants of those diseases?
- What policies, strategies and programmes are in place to reduce the impacts of climate change on health?

Analysis was conducted of regional health data, plotting the available data against weather variables over time. A variety of statistical methods was used to analyse associations with exposure to weather or climate, taking into account modifying and/or interacting factors, including current climatic conditions, the status of water supplies, food production and nutritional status, and the socio-economic and health status of the population.

VULNERABILITY ASSESSMENT OF THE IMPACTS OF CLIMATE CHANGE ON HUMAN HEALTH IN THE SOUTH-EAST REGION OF THE REPUBLIC OF MACEDONIA

The impacts of climate change on human health will become far more widespread.

Extreme high air temperatures contribute directly to deaths from cardiovascular and respiratory disease, particularly among elderly people. Increasingly extreme weather events can destroy homes, medical facilities and other essential services. Many populations in vulnerable areas may be forced to move, further increasing the risk of spreading communicable diseases and other health effects.

Changing rainfall patterns are expected to reduce the supply of fresh water, increase the frequency of floods and droughts and jeopardising food supplies.

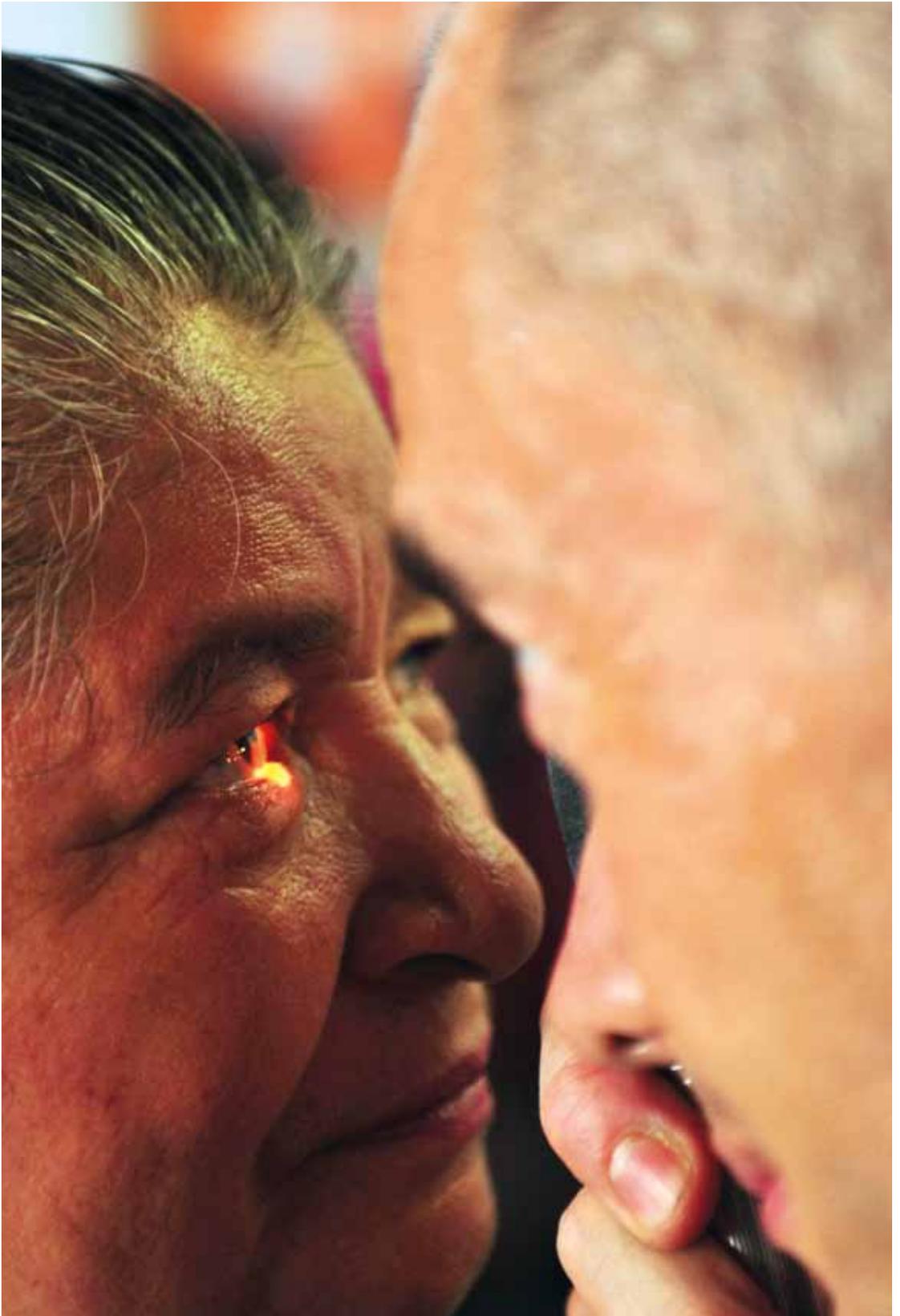
Changing patterns of infection could arise due to the sensitivity to climate change of water-borne diseases and diseases transmitted by insects.

The Republic of Macedonia was the country most affected by disasters in Europe in 2007, with a rate of 488 affected people per 1000 inhabitants, which means that almost half of the population was affected by wildfire.

During July 2007, daily temperatures reached 43°C and caused more than 200 fires, destroying over 2000 hectares of forests, and almost 1000 deaths. Under conditions of heat-wave, an increase of temperature of 1°C above the heat cut-point (30.8°C) leads to an increase in mortality of 4.8%.

About 10% of the population still lack access to clean and safe water for drinking and other basic needs. In addition, there are year-on-year growing trends for certain groups of communicable diseases, especially those associated with contaminated food and water (salmonellas, alimentary toxic infections, shigelloses). Recent studies on foodborne diseases show that disease episodes caused by Salmonella bacteria increase by 5-10% with each degree Celsius rise in temperature.

Therefore it is important to act now.



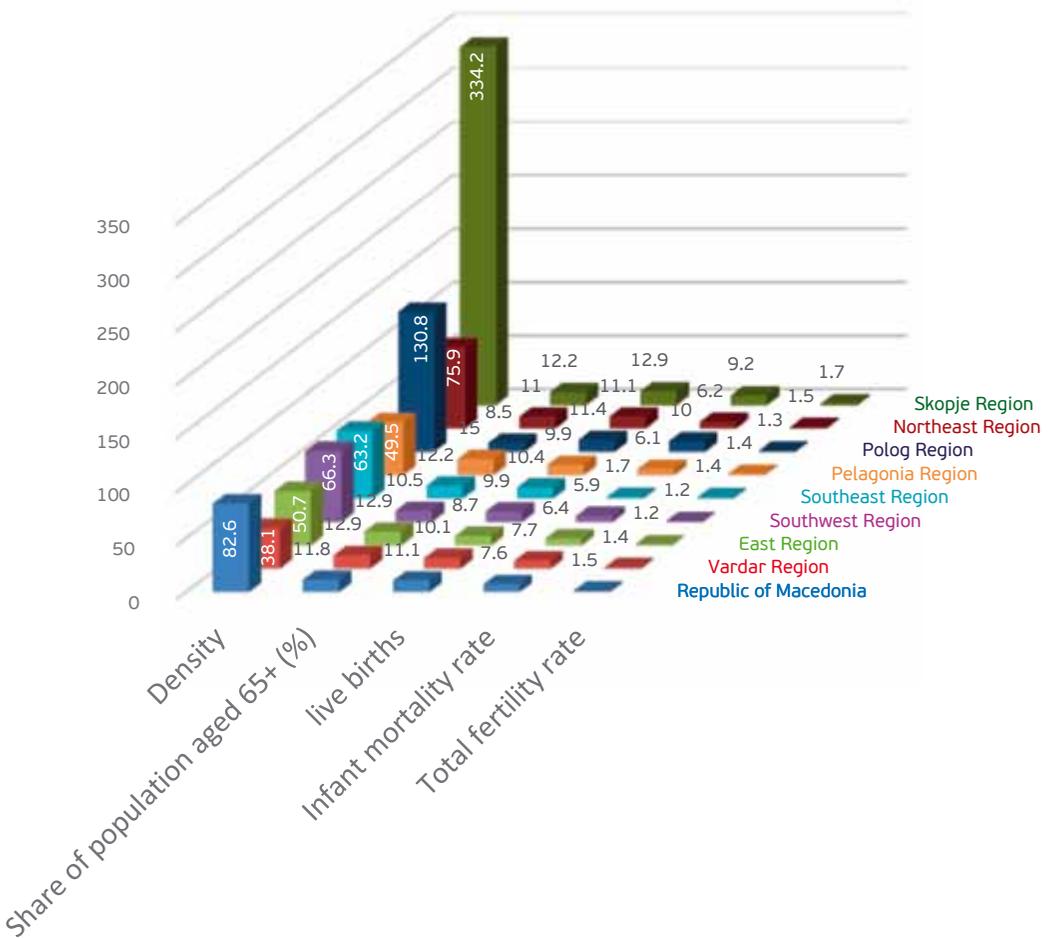


VULNERABILITY ASSESSMENT OF THE IMPACTS OF CLIMATE CHANGE ON HUMAN HEALTH IN THE SOUTH-EAST REGION

The South-East Region of the Republic of Macedonia has been identified as especially vulnerable to increasing temperatures and decreasing sums of precipitation accompanied by heavy rainfalls and more frequent extreme weather events such as flooding, fires and droughts.

Analysis of the frequency of emergency calls has confirmed that the elderly are more vulnerable to extreme heat and cold than younger people. This means that future health burdens are likely to be amplified by an ageing population.

Basic demographic indicators in RM as at 30.06.2011



Throughout the country, water supplies are highly vulnerable to changes in climate. Despite predicted increases in water supply in a few basins up until 2020, climate change is expected to bring about an overall decline in mean annual runoff, significantly reducing water supplies by 2050.

Climate change can influence the incidence of certain water and food-borne diseases. For example, increased temperature will allow pathogens such as Salmonella to grow more readily in food. And as vector-borne diseases are influenced by the climate, it is likely that the range, activity and vector potential of many ticks and mosquitoes will increase in the SE region.

Agriculture in the South-East Region is highly vulnerable to increasing air temperatures, with a projected reduction in the growing season length of up to 33 days. Such a shortening of the growing season will significantly reduce the yields of crops on which much of the population depend for their livelihoods.

The monitoring of food safety in the South-East Region, as in the country as a whole, remains insufficient, especially the monitoring of domestically produced food, adding to the vulnerability of the population's health to changes in climate. Microbiological deficiencies caused by contamination of food of animal origin with Salmonella and Escherichia coli have been detected in a small number of food samples.





Marginalized communities such as Roma are typically at greater risk from natural disasters. Among other reasons, this is due to their lower awareness of disaster risk strategies, including evacuation procedures and special humanitarian distributions.

These communities, found mostly in rural areas, do not have adequate water supply and sewerage, paved roads, electricity and other basic infrastructure. Their houses are often of poor quality and easily destroyed by fires, flooding, landslides and earthquakes.

The health impacts associated with climate change include:

- Impacts directly related to climate
- Impacts resulting from environmental changes in response to climate change

The Third National Communication project included measurements of

- The crude mortality link with temperature variations
- Variations in emergency calls and link with temperature variations
- Variations of food- and water-borne diseases (enterocolitis and salmonellosis) in different temperature periods

Analysis of the seasonal mortality index and the correlation between the mortality trend and temperature variations in Strumica, the biggest town in the Region, has shown that the highest number of deaths occur in the coldest and hottest months.



VARIATIONS IN EMERGENCY CALLS AND LINK WITH TEMPERATURE VARIATIONS

The survey covered the monthly distribution of emergency calls in Strumica in the period from 2007–2012. The three parameters considered in the survey are the disease types in question, the temperature variations in different periods, and the different age groups. The conclusions may be summarised as follows:

- Emergency calls due to respiratory symptoms/diseases peak during periods of very low temperatures.
- The number of emergency calls related to cardiovascular symptoms/diseases rises with increases in temperature values. This is a significant health vulnerability given the frequency of heat waves in the Region.
- The number of emergency calls among patients above the age of 65 increases significantly with increases in temperature in the warm period of the year.



FOOD DISEASES AND WATER-BORNE DISEASES IN RELATION TO TEMPERATURE

Analysis of the ten most frequent infectious diseases in the country could be proof for of a strong link between climatic factors and diseases such as alimentary infections, diarrhoea, salmonellosis and hepatitis—diseases already associated with low levels of hygiene, sanitation, and food safety.

In the period from 1994-2008, the highest value of the seasonal index of diarrheal cases was registered in the warmer months of August, July and September, while the lowest was identified in the coldest months.

A recent study assessed the relation between the seasonal and dynamic indexes of salmonellosis cases and average weekly temperatures in different cities in the country for the period between 1998-2008. In the Strumica Region, the highest level of seasonal index of salmonellosis was registered mainly in the warm months of March, July, and August, and the lowest in December and January.

Prediction maps (European Environmental Agency) suggest that there is a possibility that the South-East Region will be attacked by vector transmitters of infectious diseases like the Asian Tiger mosquito. Though some isolated cases of the West Nile virus fever and Malaria (imported) were reported in the country last year, so far there have been no reported cases of such diseases in the South-East Region. However, based upon climate change predictions, there is a possibility of cases of Boreliosis, Leishmanisais, Tick Borne Encephalitis and an increase in the rate of food-borne or even water-borne diseases in the country and the region.



ASSESSING THE COUNTRY'S CAPACITY TO ADAPT TO CLIMATE CHANGE

The Third National Communication project reviewed the policy and legal framework to assess the country's capacity to adapt to the impact of climate change on human health.

In 2009, the Ministry of Health set up a National Committee for Climate Change and Health as a responsible body for the surveillance of activities and decision-making. The Committee is composed of representatives from various sectors: the Ministry of Environment and Physical Planning, the National Public Health Institute, the Institute of Occupational Health, the Crisis Management Centre, the Directorate for Protection and Rescue, the Hydro meteorological Institute, the State Sanitary and Health Inspectorate, the Public Health Centre of the City of Skopje, Emergency Medical Services and the Red Cross.

The National Committee for Climate change and Health has developed a Climate Change Health Adaptation Strategy that includes the following aims:

- To provide a coordinated approach and functional cooperation between the sectors and relevant institutions in terms of effective and efficient use of the available resources
- To raise public awareness about climate change and its effect on health.
- To adopt an integrated, efficient and effective approach to the development of early warning systems and management strategies to overcome the negative effects of climate change on human health due to heat waves, UV radiation, floods and fires.
- To overcome the climate change health consequences connected with air pollution and cold weather during winter by establishing control and preventive measures.
- To control and prevent allergic diseases caused by pollen in the context of climate change.
- To introduce measures to protect the population from climate-change-related communicable diseases.

The strategy was developed and adopted by the Government in 2011. The Third National Communication project's review found that most of the goals of the country's Climate Change Health Adaptation Strategy have been achieved through the adoption of an intersectoral and multilevel approach. However, lack of funding and human capacities were found to be major impediments to the effective implementation of the strategy, and the project identified a number of areas in need of improvement and set out the following recommendations:

- *Intersectoral engagement and coordination* should be improved (especially through greater involvement of local government).
- *Measures to raise the awareness of health workers about the health risks of climate change* has been introduced but proper follow-up and evaluation of this measure are lacking.
- There is *no data about activities undertaken to raise public awareness* about climate change and health.
- Although an early warning system for monitoring food-borne and water-borne diseases is operating on a regular basis, and although the monitoring of drinking water supply systems and drinking water samples is under the control of the public health system and seems to be manageable even in more extreme conditions, food safety control and the implementation of the Hazard Analysis Critical Control Points (HACCP) system are uncertain since there is no proper and transparent information.

- The region needs more *precise meteorological observations, data and predictions* in order to take precautionary measures in periods of risk. The existing national air pollution alert system should include this region as well. Currently there is a *lack of air quality data in the region*.
- Though emphasized in the National Strategy, actions regarding *UV radiation morbidity and mortality data and UV radiation protection measures and monitoring system* have still not been introduced. This includes the need for a special assessment of UV health risks to agricultural and other workers exposed to the climate.
- Although there is evidence that *extended seasons of pollenosis* in the country will pose serious treats to human health, monitoring has still not been introduced outside the Skopje Region.
- Although the *flood early warning system* managed at multisectoral level is operating well, there are a number of complementary measures to be taken in order to prevent possible health impacts, especially in rural/agricultural settlements. The activities planned in the National Crisis Preparedness Programme are of great additional importance for the role of the health sector in such circumstances.

The Third National Communication project emphasizes the need to boost the capacity of hospitals to cope with the impacts of climate change on health. Hospitals need to maintain a high level of preparedness for natural disasters, providing safety for patients and medical staff at times of emergency.

Despite evident deterioration of the country's core public health functions over the last few years, there is almost complete institutional coverage by public health agencies throughout the country.

The Third National Communication project notes that there is still no proper integrated health and public health information system in the country. The main sources of health-related information are confined to mortality and morbidity data from the State Statistical Office, the Institute of Public Health, the national Health Insurance Fund, regional centres of public health and healthcare institutions.

| CLIMATE EFFECT | IMPACT | CONFIRMED IN THE STUDY | CONSEQUENCE (PRESSURES TO THE HEALTH SYSTEM) | PROBABILITY TO HAPPEN |
|---|--|--|---|--|
| Increased summer temperature, included heat waves | Increased summer mortality especially among elderly | + | Increased demands on health and adult care services |  high |
| Warm periods/ heat waves | Increased emergency calls | + | Increased demands on health and adult care services |  high |
| Increased average temperatures | Increased in frequency and intensity of Summer air pollution (ozone) | To be confirmed (no appropriate data) | Increase in cases of mortality and morbidity linked to respiratory diseases and associated hospital admission |  moderate |
| Summer temperature | Temperature morbidity | + | Increased demands on health and adult care services (including workers) |  high |
| Increase in average temperature | Extended pollen season and more days with high pollen counts | Assumption to be checked and confirmed (need investigations) | More people suffering with hay fever and pollen asthma |  moderate |
| UVB radiation | Sunlight/ UV exposure | To be confirmed after introducing proper monitoring and warning system | Increased demands on health and adult care services especially vulnerable population of workers |  moderate |
| Winter temperature | Temperature mortality (winter) | + | Reduced demands on health and adult care services |  high |
| Winter temperature/ cold waves | Increase in demand for emergency medicine | + | Overwhelming of public services |  high |

| | | | | |
|---------------------------------------|--|--|--|--|
| Extreme weather events | Increase in demand for emergency medicine | + | Overwhelming of public services |  high |
| Extreme weather events | Health facilities infrastructure | Hospital safety index | Potential impacts on safety of hospital facility and operation |  Low-moderate |
| Extreme weather events | Transport network failure, destruction of homes, water shortages, displacements, disruption of access to health services | Assumption | Increased demands on health and adult care services in the risky areas |  moderate |
| Temperature and rainfall | Increased prevalence and survival of certain arthropods such ticks and mosquitoes | To be monitored and confirmed | Vector born diseases |  Low-moderate |
| Increased average temperatures | Increase in certain water born diseases, deterioration of drinking and surface water qualities, especially rural settlements | Potential treat, to be monitored permanently | Health impacts such as diarrhea and nausea |  Low-moderate |
| Summer temperature | Multiplication of pathogenic microorganisms | Partially confirmed | Increase in food born diseases |  moderate |
| Summer temperature | Exposure of medicines to high temperature | Hospital safety index | Reduction in medicine efficacy |  Low-moderate |
| Extreme weather events | Patient recovery rates in hospitals may be compromised | Hospital safety index | Increased demands on health and adult care services |  moderate |
| Extreme weather events | Impact on health workers and working conditions | Hospital safety index | Reduction in health workers performances |  moderate |

ACTION PLAN

To minimize the impacts of climate change on human health and derive maximum economic benefit, the Report proposes a set of cross-sectoral adaptation measures to be implemented by the relevant stakeholders. The key actions recommended by the Third National Communication to reduce the vulnerability of the country's population to the impacts of climate change on health include:

- The preparation and establishment of a Regional Climate Change Adaptation Strategy in line with the Third National Communication and other national policy documents related to climate change, disaster risk and health.
- The preparation of a Flood Action Plan (including a chapter on the health sector and introducing a Flood Early Warning System), either as a separate plan or as an amendment to the existing disaster preparedness plan.
- The establishment of a Regional Committee for Climate Change, Health Monitoring and Adaptation process that would work on engaging communities and ensuring they are well informed.
- Strengthening of the capacities of public health and healthcare institutions in the region for the improvement of existing public health activities in the region.
- Education and training of health professionals to ensure they are better prepared to deal with the impacts of climate change.
- The establishment of adaptation and resilience plans in healthcare institutions to increase resilience and reduce the impacts of climate change on human health.
- The creation of an information database that would include all available research on climate change effects in the region as well as the establishment of an early warning and monitoring health information system.
- Improvement of the quality and quantity of drinking water, especially in rural areas.
- The establishment of an efficient system for food safety control and implementation of the HACCP in all levels of food production, transport and marketing, including the introduction of a transparent and regularly updated database on regional food safety.