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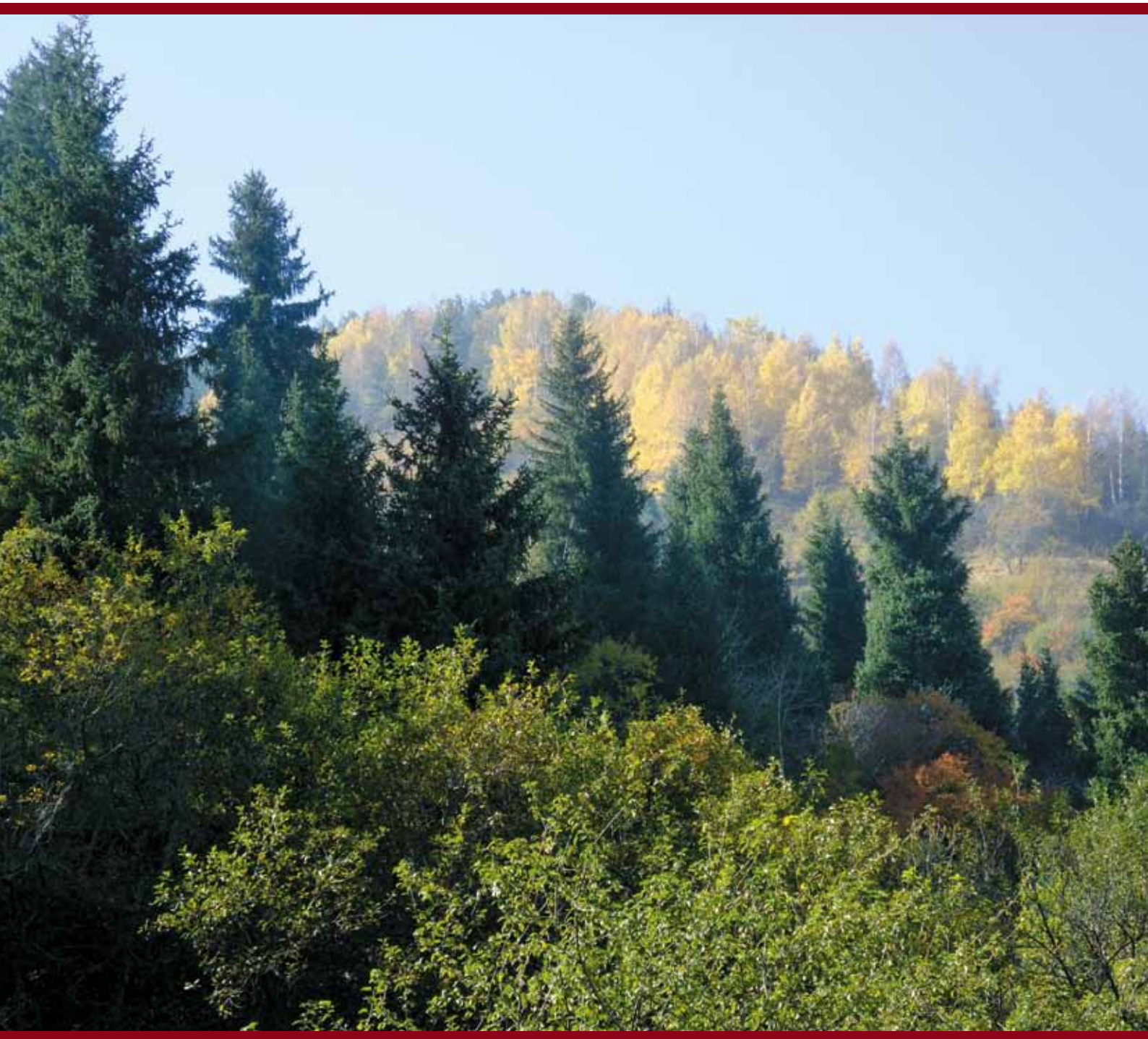
Ministry of Health
of the Republic of Kazakhstan



PROTECTING HEALTH FROM CLIMATE CHANGE IN KAZAKHSTAN

INTRODUCTION

The impacts of climate change are already starting to occur, and protecting the health of humans needs to be a central part of the adaptation process. Based on the findings and observations of a vulnerability assessment on the health impacts of climate change, an action plan was developed. This programme also contributes to national and international policy on climate change, providing a focus on health.

This work is part of a seven – country initiative of the WHO Regional Office for Europe and has been funded by the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU). The project aims to protect health from climate change through addressing adaptation, strengthening of health systems and building institutional capacity.

WHO/Europe coordinates the projects, contributing to the implementation of the WHO regional workplan on climate change and health. It also has provided technical assistance, guidance, training and expertise. In each country multisectoral steering committees are established, and a project coordinator oversees implementation at the national level. Country coordinators are supported by WHO/Europe. All activities are being implemented in collaboration with the BMU and the national Governments of the seven countries.

Federal Ministry for the Environment, Nature Conservation and Nuclear Safety

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CURRENT SITUATION AND CLIMATE IN KAZAKHSTAN

Alpine plateau Assy, Almaty oblast, 2011

Kazakhstan, the ninth largest country in the world, strives to join a club of fifty most developed countries of the world and to overcome remaining challenges in relation to the health status of the population and inherited environmental issues.

Kazakhstan's arid climate, characterized by high temperatures in summertime and low temperatures in wintertime, as well as by its sharp daily and annual differentials, supports the development of adaptive capacity within the ecosystem, and also has an unfavourable effect on the population health.

Population

According to the Statistics Agency, the population of Kazakhstan in 2011 was estimated at 6.4 million with an approximate population density of only 6 persons per square kilometre. The population growth is currently stimulated by immigration from neighbouring countries (the Russian Federation, Uzbekistan, Kyrgyzstan and the People's Republic of China) and by a significant increase in the birth – rate over the last ten years. The most densely populated provinces (not counting Almaty and Astana metropolitan cities) are South Kazakhstan, Almaty and Zhambyl which accounts for 30 % of the total population of the country. Urban population constitutes 55 % of the total.

Sex ratio

According to the 2009 census, there are 7.7 million men (48.2%) and 8.2 million women (51.8%). The current demographic situation in Kazakhstan is also marked by a dynamic increase in aged population, particularly women.

Life expectancy

Average life expectancy is 68.4 years in 2010: 63.5 for men and 72.3 for women. This indicator has a tendency to rise, but remains relatively low in comparison with the figures from 1990 and compared to industrially developed nations.

Gross domestic product

GDP per capita is approximately 9136 USD (2010). Kazakhstan is classified as an upper middle income country. In 2008, 11 % of Kazakhstan's GDP was attributed to industrial production and 5 % to agricultural, while minerals, oil and gas constituted 73 % of export and 39 % of GDP.

The main source for economic growth in the country is rapid development of the raw mineral resources. Kazakhstan has approximately 0.5 % of the world reserves of mineral fuel, comprising 30 billion tons of standard fuel, of which 80 % is coal, 13 % oil and gas condensate, and 7 % natural and associated gas.

Geographical and environmental context

The Republic of Kazakhstan is located in the northern and central parts of Eurasia, in four climatic zones, and occupies 1.8 % of the land territory of the Earth. About 75 % of the country territory is exposed to increased environmental destabilization risk related to past military nuclear testing programmes, industrial and mining activities, as well as land degradation, desertification, and water scarcity problems. Air and water pollution are a significant environmental concern in Kazakhstan.

CLIMATE CHANGE IS ALREADY HAPPENING

The average annual air temperature in Kazakhstan has been increasing by 0.31°C per decade since 1936. Rapid warming was observed for winter months; an average increase of 0.44°C per decade has been observed across Kazakhstan, and 0.60-0.65°C per decade in the west and in some areas of the northern and central parts of the Republic. The slowest temperature increase is observed in summer periods, on the average by 0.14°C per decade nationally, and less than 0.10°C per decade in the west of the country.

The analysis of climate change indicators for the period 1936-2005 showed an increase in the number of extremely warm days and nights with a reduction in the number of extremely cold days and nights. The duration of heat waves has significantly increased in most territories of Kazakhstan (in some areas by 2-3 days every decade), allowing extremely high air temperature to be observed for up to six consecutive days. Meanwhile, the duration of cold waves has significantly decreased (in some areas by 3-4 days per decade). The change in precipitation in the territory of Kazakhstan for the period 1936-2005 has been characterized by an increase in precipitation intensity in the northern, most humid areas of Kazakhstan.

Floods, landslides, mudflows and avalanches

According to WHO estimates, the south – west and south – east regions of Kazakhstan is experiencing more frequent flood hazard.

PROJECTED CLIMATE CHANGE

Temperature increases

Average changes in mean annual temperature for the territory of Kazakhstan are projected to increase from 3.3ºC to 6.2ºC by 2085 for various climate – geographic zones, using different scenarios.

Precipitation change

Winter precipitation is expected to increasing until the end of this century, whilst for summer, only two models predict increased precipitation from the middle of the century, and a decline in precipitation is anticipated by the end of the century. Since most of Kazakhstan's regions are arid due to comparatively low precipitation, a rise of even 20–25 %, given concurrent ground air temperature rises, may not have a positive effect on ecosystems, agriculture and water resources.

Geographical change

Under a minimal warming scenario, the humid zone borders will shift to the north by 50 to 100 km and the arid zone will reduce by 6–23%. According to the UN, out of 272.5 million hectares of the territory of Kazakhstan, 179.9 million hectares, or 66% of the total area are affected by desertification. These changes in geographical zones may also cause possible changes in seasonal fluctuations and the distribution of some infectious diseases, particularly vector-borne diseases.

A decrease in mountain river flow is expected due to glacial contraction by the end of the 21st century. On the northern slope of the Zaili Ala Tau, the flow will reduce by about 12% in relation to flow from the mountains.

CLIMATE CHANGE AND THE WIDER DETERMINANTS FOR HEALTH

East Kazakhstan, 2011

Global environmental changes are affecting climate, which in turn will impact in profoundly adverse ways on some of the most fundamental pillars of life and determinants of health, such as food security, water safety, air quality, increases in disasters and emergencies and infrastructure damage.

Food security

Overall in Central Asia, crop yields are projected to decrease by up to 30 % by 2050. In Kazakhstan, despite increasing crop yields over the past few years, allowing export of grain to neighbouring countries, lower productivity of arable lands is expected due to droughts, dry winds, as well as spring and autumn frosts (reaching 50-70 % in some years). The problem in compounded by resalinization and heavy metal pollution of soils in irrigated areas due to growing scarcity of fresh irrigation water and wide use of repeated drainage and escape water may aggravate food availability for the most disadvantaged, particularly poor people in rural settings.

Water safety

One of the most acute problems for Kazakhstan, according to the last report on the Millenium Development Goals, is that at least 10 % of households lack piped household water and about a quarter of the population have no access to appropriate sewerage. Based on the estimates of the Ministry of Agriculture, 40 % of the entire rural population of Kazakhstan still has no access to safe drinking water.

Increased temperatures and infectious diseases

Increased temperatures are providing optimal conditions for the spread of infectious agents and vectors – ticks, rodents, etc. in territories that were not previously affected, leading to the new occurrence or recurrence of forgotten infectious diseases, and increased rates of gastro – intestinal infections, especially among women and children.

Increased risk of landslides and mudflows

Landslide and mudflows are the leading cause of infrastructure damage in affected areas and pose a serious threat to health, with increased risk of injuries, infectious diseases outbreak during flooding, respiratory disease and mental illness in the aftermath, and damage to crops.

HEALTH IMPACTS ALREADY OBSERVED FROM CLIMATE CHANGE

Public health priorities in the Republic of Kazakhstan

The main causes of death in 2011:

Diseases of the circulatory system	35,3 %
Neoplasm	11 %
External causes of death, trauma	12,2 %
Diseases of the respiratory system	5,6 %
Diseases of the gastrointestinal system	6 %
Infectious and parasitic diseases	1,5 %

Based on the current main causes of mortality and morbidity of Kazakhstan, the following results were obtained from the analysis of selected group of diseases.

Cardio-vascular diseases

The analysis of morbidity and death rates from circulatory illnesses for the last 10 years (2000–2009) revealed appreciable distinctions between the regions of Kazakhstan. The highest morbidity of ischemic heart disease is observed in Southern Region, consisting of three oblasts (406.0 at an average national rate; 372.6 per 100 000 population)

An increase of ambient temperature by 1°C during the warmer months is associated with a decrease in deaths due to hypertension, no increase in deaths due to ischemic heart disease, and an increase in deaths from cerebrovascular diseases from 1.2% to 2.7%. Women with cerebrovascular diseases aged over 60 are the most sensitive to temperature increases in the warm season in the city of Astana.

However, despite expectations, no evidence has been found for a statistically significant association between temperature decrease in the cold season with an increase in daily mortality due to hypertensive or ischemic heart diseases. The results obtained from analysis of cerebrovascular diseases support the development of the hypothesis, related to increased mortality with decrease in temperature during the cold season. Additional research will be needed to verify the hypothesis with larger sample.

Respiratory diseases

An increase in temperature by 1°C in Astana is associated with a decline in ambulance calls with bronchial asthma from 0.5 % to 3.6 % in different age groups during the warm season. In the cold season, we observed an association between a temperature drop by 1°C and a rise of ambulance calls for the same diseases from 1.7 % to 2.0 % in different age and gender groups.

Communicable diseases

An activation of zoonotic arthropod – borne viruses and bacterial diseases (Crimean – Congo Hemorrhagic Fever, Hemorrhagic Fever with Renal Syndrome, plague, etc.) with following outbreaks of Crimean – Congo Hemorrhagic Fever has been observed with human losses, starting in 2009 in new territories of the southern regions of the country.

Higher temperatures are associated with higher monthly incidence of salmonella infection in Astana. An increase of 1°C was associated with a 5.3 % increase in the number of cases in the same month, while precipitation was less associated with salmonella infection incidence.

An increase of 1°C in Almaty was associated with a 3.3 % decrease in the number of cases of hepatitis A one month later. An increase in precipitation in North Kazakhstan oblast by 1mm was associated with a 1.0 % decrease in the number of cases two months later. In South Kazakhstan Oblast an increase of 1°C was associated with 2.4 % decrease of hepatitis A in the same period and 2.3 % in the following month. No statistically significant associations were found between climatic variables and cases of hepatitis A in Astana city.

Mental health

The number of suicides in the Republic of Kazakhstan is alerting and amounted to 54.7 per 100 000 population on average. The peak increase in suicide frequency is noted in spring and decrease is noted in autumn – winter.

An increase of daily maximum apparent temperature in Astana by 1°C is associated with a 2 % rise in deaths from intentional self – harm and a 9.55 % rise in deaths from drowning. The increase of relative humidity by 1 % was associated with a 4.87 % increase in drowning. Additional research will be needed to analyse the association between climate and mental health outcomes in Kazakhstan.

Injuries

Considering the decrease of people affected during emergencies in Kazakhstan, road traumatism as a public health concern and its relation to weather conditions was analysed. Despite a lack of strong annual seasonal variation, taking into account the total number lives lost (death in hospital due to trauma caused by municipal transport), the greatest incidence of deadly traumas is noted in spring and autumn (each accounting for 29 % of the total). In the summer months, 22 % of all deadly traumas are recorded, and during the winter period 20 % are observed. For overall incidence of traumatism, 47 % of traumas occur in autumn and in winter, and 53 % in spring and in summer.

PROJECTED HEALTH IMPACTS FROM CLIMATE CHANGE

Turgen Gorge, Almat Oblast, 2011

Projected demographic growth, migration from neighbouring countries, combined with increase in the proportion of the elderly population to 24 million people by 2050, will possess additional demand on the provisions of food and appropriate care for children and elderly.

The increase in average annual temperature will establish optimum conditions for expansion of the habitat of the Ixodes tick vector for Lyme disease (40° latitude further north). It implies the Central, Eastern, and Northern oblasts of Kazakhstan are also likely to be Crimean – Congo Hemorrhagic Fever hot spots.

There is a probability that some climate changes will have a potentially favourable impact on the health of the population of Kazakhstan. For example, milder winters can reduce winter mortality due to respiratory – related diseases.

Vulnerable populations

Populations living in poverty and in **rural areas** are particularly vulnerable, 40 % of whom lack access to safe drinking water contributing to an increased risk of infectious diseases. The situation is exacerbated by a lower number of physicians in rural areas: just 14.1 per 10 000 population, compared to 58.3 in urban areas (according to data for 2009).

Residents in **urban areas**, such as cities and towns, comprise more than 55 % of the population. The risk of the urban heat – islands effect and the tense ecological situation in large cities are particular causes for concern. It is of note that the majority of the urban population lives in the five most polluted cities (Almaty, Shymkent, Ust – Kamenogorsk, Aktobe, Karaganda and Temirtau) and accounts for more than 3 million people, or 40 % of the total urban population.

Environmentally and geographically vulnerable areas

The most vulnerable regions in the country are South Kazakhstan, North Kazakhstan and Zhambyl regions (located in the south, southeast and north of Kazakhstan). In mountainous areas and areas near large water reservoirs, risk of natural disasters becomes a significant factor for territorial development and urban planning.

This specifically concerns Almaty, the biggest city of Kazakhstan, with about 1.5 million inhabitants, and is anticipated to grow to up to 4 million by 2040. The city is located in an increased risk zone exposed to such natural disasters as earthquakes, mudflows and hurricanes.

Vulnerable populations by health status

Elderly people, whose numbers are growing in Kazakhstan and are projected to reach more than 11 % of the population by 2030, will require the provision of health and social services and are increasing the burden on the health sector with regard to their susceptibility to the impacts of heat – waves and cold – spells.

CLIMATE CHANGE: COSTS AND ADAPTATION BENEFITS

Almaty, 2011

Basement of a newly built hospital, 2012

- **Economic losses due to extreme natural events,** the majority of which are floods and mudslides are of significant concern in Kazakhstan. Even in early 2012, a new hospital was flooded in the village of Badam in Ordabasinsky rayon of the South Kazakhstan region due to high water flooding. Over one billion KZT (about 7 million USD) in total were allocated for consequences of flooding in 2012 for the South Kazakhstan Region alone.
- **The summarized negative economic effect** is associated with the loss of 66 % of the total area affected by desertification, compounded by the response measures to increased number of emergencies, including communicable diseases, which account for a considerable amount of local municipalities.
- **Adaptation today will save costs tomorrow** – the costs of adapting the health sector to the impacts of climate change now will be lower than the costs of responding to the increasing impacts in the future.
- **Adapting today will contribute to a healthier, more resilient country** – with potential wider benefits to educational and economic outcomes and productivity.

Health service preparedness for climate change

Preventive measures are incorporated and budgeted for in the State Health Development programme "Salamatty Kazakhstan" in relation to:

- control of infectious diseases (including climate – sensitive diseases)
- introduction of telemedicine
- provision of rescue services on the roads, and emergency services with respective ministries and agencies
- A twenty – four hour anti – epidemic headquarters operates to ensure timely and prompt preventive and anti – epidemic measures and control activities under the Ministry of Health of Kazakhstan, and at all the centres of the State Sanitary Surveillance Service in Almaty city and regions
- Vulnerability analysis of health facilities to floods in East Kazakhstan with the use of geo – referenced data has been introduced
- Mitigation measures for climate change within the health sector are to be initiated as a follow up to the adopted Law on Energy Efficiency

Involvement of other sectors in:

- Safe water and food to reduce the risk of infections, thus preventing and reducing morbidity and mortality risk from infectious and parasitic diseases through providing safe food stuffs, improving access to safe drinking water and suitable sanitary and hygienic amenities.
- Reducing injuries from natural disasters by developing measures to prevent and reduce health impacts related to injuries, accidents due to extreme natural events (landslides, mudflows, fires, etc.).

A NATIONAL PLAN FOR CLIMATE CHANGE AND HEALTH

Within the framework of Salamatty Kazakhstan Programme, a National Action Plan has been developed and was endorsed in September 2012 for implementation from the state budget. Its key priorities and recommendations are summarized below.

Climate change and health priorities

- **Protecting health from extreme weather events** by creating conditions for reducing morbidity and mortality risk from non – infectious diseases related to unfavourable weather events (extremely high or low temperature waves, crucial changes of air pressure).
- **Improving the infrastructure of the public health system to** create safe and beneficial conditions and providing qualified health care and sanitary service to the population exposed to the changing climate.
- **Strengthening research, workforce** and specialists potential and improving training programmes on climate change and human health.
- **Improved monitoring system** of the factors related to climate change and its impact on health
- **Increasing awareness of the population** on preventing of effects of adverse environmental factors, including health effects of climate change.

Recommendations and actions to strengthen health adaptation

1. **Strengthen and mainstream public health and health services** in general, and ensure climate change is included in wider health and public health policy; more specifically, strengthen environmental health services, including water and sanitation, vaccination programs and laboratory services.
2. **Build capacity and develop the workforce** by integrating training on climate change and health impacts and responses into mainstream undergraduate and postgraduate training programs; ensure sufficient staffing and resources and build capacity of staff in priority areas related to climate change and health.
3. **Conduct prevention activities for non – communicable diseases** related to natural and climatic factors, including diseases of the heart, circulatory system, respiratory system and injuries.
4. **Enhance and strengthen surveillance of climate – sensitive infections,** for example, on water – borne infections and tick – borne infections with the respective prevention and treatment measures required.
5. **Improve monitoring** of climate – related factors that affect health, for example, air quality, water safety and levels of malnutrition, and ensure that data is used to improve future planning and responses.
6. **Develop early – warning systems** for extreme weather events, to reduce the impact of floods, mudslides, poor air quality, dust storms and heat – waves. Identify the health sector response and develop appropriate plans.
7. **Strengthen health sector engagement in emergency planning** for extreme weather events and develop cross – sector plans if they do not already exist, for example, on heat – waves and flooding.
8. **Create green health services and ensure resilience** to contribute to mitigation efforts and ensure energy security to protect patients, staff, equipment and infrastructure, from floods, mudslides and heat – waves, and to ensure that there is continuous and adequate supply of clean water and energy during extreme weather events.
9. **Communicate and raise awareness** by developing communications plans for key messages on climate change and health for other sectors and the general public. Develop communications messages to be released in the event of an early – warning system alert for an extreme weather event.
10. **To conduct scientific research** it is necessary to study and assess the influence of climatic factors on the health of the population and implement green innovation technologies in the health system.

Delivering the action plan

- **Governance and sustainable resources –** a national steering group and working group has been established to ensure the development and delivery of the national programme. Reporting arrangements, responsibilities and funding has already been identified for programme implementation.

Future research recommendations/priorities

- **Innovation, research and evaluation –** to generate new ideas for protecting health from the impacts of climate change; to provide more information for future planning on areas of high potential risks; to evaluate strategy interventions; and on cost–benefit analysis for a range of interventions that have environmental co – benefits that also protect health from climate change.

DELIVERING THE ACTION PLAN

A National Action Plan of the Ministry of Health has been developed and was endorsed in September 2012 for implementation from the state budget within the framework of the State Health Development Programme Salamatty Kazakhstan.

This project became the first attempt to combine heterogeneous expertise from different fields and to initiate discussions, convert them from economic and environmental terms, also promoting green development as being seen as a contributing factor to the health of the population of Kazakhstan.

Since 2011 four PhD students at Astana Medical University have initiated their research on assessing the impact of climate change on health on non-communicable diseases.

Awareness raising of the population

The following activities were undertaken within the project:

- Set of information and education materials was developed and distributed for health managers and general population: 5000 flyers, 300 wall and desk calendars, 250 ecological bags, banners, newsletter, etc.
- Two press conferences were conducted for media; national TV channel «Kazakhstan» broadcasted two documentaries.
- Certificate of Appreciation received from the Ministry of Environment Protection for the participation in the 7th Kazakhstan International Exhibition «Green Innovations, Technologies and EcoServices Fair» in the framework of the 7th «Environment for Europe» Ministerial Conference.
- Series of regional workshops using Healthy Lifestyle Centres with involvement of media are expected at end of the project.
- Through a series of meetings and workshops at sub-regional, national and sub-national levels, around 1060 people were trained on climate-related issues on a wide-range of respective areas: control of infectious diseases (502 persons), disaster preparedness and management (119), tools and methods for the assessment of healthcare system to climate change (103), and national meetings (357).
- As a results of the training conducted for public health professionals, awareness on climate change is increased in different groups by an average of 25–35%

Infectious disease surveillance strengthening

Following the outbreak of Congo- Crimean Hemorrhagic Fever (CCHF) in southern regions of Kazakhstan with five cases of death in 2009, the WHO

mission reviewed tick surveillance, control policy and practice; as well as the components of the current national CCHF control strategy.

- Based on the findings of the review, a two-day workshop was organized in Almaty during September 2009 for 60 people. Participation was mainly public health professionals, epidemiologists other then clinicians, laboratory specialists and zoologists from Scientific and Practical Center for Sanitation and Epidemiological Expertise and Monitoring, academia and affected areas such as South Kazakhstan, including Turkestan district, Zhambyl and Kyzylorda oblasts.
- 50 laboratory workers were trained on identification of viral infections using PCR techniques with representatives of all 14 regions of Kazakhstan and well as the cities of Almaty and Astana.

As a result of the mission and its recommendations, lessons learnt from the outbreak were reflected in the strategic action plan of the Ministry of Health for the period 2011–2015, aiming at strengthened laboratory capacity to detect CCHF, anthrax, tularemia, brucellosis and establishing closer intersectoral collaboration in most vulnerable regions (Jambyl, Kyzylorda and Southern Kazakhstan regions) with allocation of state funds.

The following equipment and supplies were provided to the regional laboratories to ensure correct diagnosis and early detection of viral diseases:

1. Centrifuge Fuga/vortex Micro-Spin FV-2400, SIA "BioSan";
2. Analyzer automatic luminescent multiplex ALA-1/4 with accessories;
3. Two air conditioners for regional virology laboratory at Republican SES;
4. ICT set: computer, printer, scanner, copier, coloured printer and monitor for regional virology laboratory at the Republican SES;
5. USB with dual converter for 10 of the regions;
6. Set of consumables for viral laboratories for all regions.

Disaster preparedness and response within health care

With the aim to accelerate the understanding of climate change impact on health, analysis of the capacity of the health system in Kazakhstan for crisis management and IHR monitoring exercise were undertaken, identifying key bottlenecks and directions to improve detection of infectious diseases and emergency management, mainly related to poor and isolated information systems maintained by agencies, limited and fragmented capacity to assess the risks, diagnose the agent and prevent human losses.

It laid a basis for the development and adoption of a WHO/Europe public health and emergency management (PHEM) course as part of its continuous medical education as the State Standard for Education on the issue of Emergency Health specialty in 2010 (first country to do so in the WHO European Region). Guidelines for health managers and course to be counted for certification purposes.

Furthermore, in 2010–2011, a Vulnerability Risk Analysis and Mapping exercise was undertaken in the East Kazakhstan Oblast to indicate vulnerability of 99 health facilities to floods and propose the optimal emergency response plan in close collaboration with ministries of emergency and health and their local departments there.

The group working on the project was awarded by medals from the Ministry of Emergency Situations for their contribution to the prevention of disasters.