

# Climate change adaptation to protect human health



## CHINA

This summary gives an overview of the aims, activities, challenges and results of the project “Climate change adaptation to protect human health” for China.

### Project background

The “Climate change adaptation to protect human health” project is a global initiative jointly implemented by the World Health Organization (WHO) and United Nations Development Programme (UNDP). The seven pilot countries were Barbados, Bhutan, China, Fiji, Jordan, Kenya and Uzbekistan. The project was co-funded by the Global Environment Facility (GEF) Special Climate Change Fund (SCCF).

### Overall project goal

The series of pilot projects aimed to “increase adaptive capacity of national health system institutions, including field practitioners, to respond to climate-sensitive health risks”.

### China at a glance

China is located in eastern Asia, bordered by the East China Sea, Korea Bay, Yellow Sea and South China Sea. It has a coastline of 14 500 km, and covers a total area of 9 596 960 km<sup>2</sup>. The country has a prominent monsoon climate. Across its large landmass, it has various other climate zones, from tropical in the south to subarctic in the north. Temperature zones include, from south to north: equatorial, tropical, subtropical, warm temperate, temperate and frigid-temperate zones. The subtropical, warm temperate and temperate zones occupy 70% of the mainland. In addition, the country has a complex topography and changes in elevation.

### *Climate change and health in China*

Climate change is projected to increase the frequency and intensity of extreme weather events such as floods, heat waves, droughts and dust storms. The largest direct health impacts are expected from heat waves, especially in urban centres.

- ▶ Very hot days and heat waves increase morbidity and mortality, unless effective adaptation measures are in place. Heat waves can specifically increase the morbidity and mortality due to cerebro-cardiovascular and respiratory system diseases, which are already higher in China than in any other country of the world. Today, 45% of all deaths in China are due to cerebro-cardiovascular diseases, and the associated health-care costs and labour force losses are estimated to exceed US\$ 2500 million per year.
- ▶ Individuals over 60 years of age and infants are the most vulnerable population groups. It is estimated that the number of deaths caused by the recorded heat waves is 2–3 times higher than that during normal summer periods.
- ▶ Health risks are further increased when higher heat-wave intensity and frequency is combined with a high prevalence of cardiovascular diseases in an ageing population, rapid urbanization and persistently high levels of urban air pollution.



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## Objectives of the China project

China was selected to participate in the global project because of its vulnerability to heat stress. Therefore, the specific objective of the project was to strengthen the national capacity to respond to the increased health risks due to heat stress.

The main expected national benefit from this project was a reduction in the impacts of climate change on the incidence of and mortality from heat-related cerebro-cardiovascular diseases and the respective social-economic burden in four pilot sites in six climate zones. This was done through the implementation of heat-wave forecasting and early warning systems (EWS).

The Institute for Environmental Health and Related Product Safety, Centers for Disease Control (CDC) China was the executing agency of the project, and WHO and UNDP provided guidance and supervision. The Ministry of Health led a steering committee composed of representatives from the Ministry of Finance, Environmental Protection Bureau and National Meteorological Bureau, as well as relevant experts from agriculture, water conservation and other sectors. Local governments, various national ministries (e.g. Ministry of Education, Ministry of Civil Affairs and Ministry of Transport) and other agencies such as the China Red Cross Society were involved in implementing the activities and measures.

### ***Main outcomes and outputs: climate change adaptation in China***

The three global outcomes defined for the project “Piloting Climate Change Adaptation to Protect Human Health” were adjusted slightly to the specific context of China and its identified health risks related to climate change.

## Outcome 1

### **An early warning system established for impending heat waves to protect people at risk of cerebro- and cardiovascular diseases**

In the frame of this project, a series of steps were taken to develop an EWS for heat waves and their associated health effects. First, meteorological and health monitoring data had to be linked, and coordination mechanisms and algorithms for the correlation of the respective data developed. (Regular updates may show altered relationships as climate and other parameters change.) Working towards these outcomes, China specifically focused on the following:

- ▶ Establishing a multisectoral cooperation mechanism between the health sector, the National Meteorological Bureau and the Environmental Protection Bureau;
- ▶ Collecting and analysing information on the relationship between meteorological and health data (with the generalized additive model) in order to establish a model to forecast health risks for vulnerable groups;
- ▶ Monitoring regular reporting of climate-sensitive health outcomes (including outbreaks) through the health-care services;

### **Barriers/challenges to implementation of the various strategies, policies and procedures**

The following barriers were identified:

- ▶ Insufficient data collection and data-sharing among environmental, meteorological and health agencies;
- ▶ Lack of capacity to undertake research to quantify the health risks of climate change, and to identify effective and efficient adaptation options;
- ▶ Limited public knowledge of the health impacts of climate change;
- ▶ Use of paper documents to collect hospital outpatient data at some pilot sites in China, which made data collection difficult;
- ▶ Lack of appropriate policy and funds for scaling up EWS from pilot sites to more sites and regions.
- ▶ At the outset of the project, only 51.97% of the district health managers (63 respondents) considered their response plans to be effective in dealing with climate-sensitive health risks; and 57.7% considered that interagency and intersectoral barriers prevented effective responses. This perceived vulnerability considerably decreased by the end of the project.

### **Solutions**

- ▶ The project strengthened communication between decision-makers and the public health sector. Multisectoral cooperation mechanisms were established among the health, meteorological and education sectors, as well as environmental protection and other sectors. Internal cooperation mechanisms within the health system through the local Health and Family Planning Commission, CDC, hospitals and community health centres were strengthened. These cooperation mechanisms facilitated resource-sharing and guaranteed the coordination and implementation of the project.
- ▶ The project encouraged and supported Chinese scientists to participate in international activities, increasing their knowledge and capacity to reduce the health impacts of climate change.
- ▶ A scientific research database was created using national and international meteorological and disease data; this database provides accurate, prompt and authoritative disease information for monitoring, and is used in disease prevention.

- ▶ Designing a system for “early forecast, early prevention and early treatment”, which provided graded forecasts of the severity of health risks in the project community. The project in China developed software modules for a heat-related health risk EWS using a mathematical model based on historical health and climate data. This software provides early forecasts of health risks associated with heat (predicts the relative risk for cardiovascular diseases, respiratory diseases and heat stroke in the next three days) and related public health recommendations;
- ▶ Translating the public health recommendations into different communication products to reach the general population in those districts where the project was implemented (e.g. banners, posters and screens on the streets);
- ▶ Compiling guidelines for multilevel responses to the health risks of heat waves;
- ▶ Running pilot tests of the “early forecast, early prevention and early treatment” system in the pilot cities.



**Photo 1: An awareness-raising session on prevention of health effects of heat stress in vulnerable groups being conducted in China (UNDP/WHO GEF project)**

## Outcome 2

### Systemic and institutional capacity of the health sector improved to respond to climate-sensitive health risks

Under Outcome 2, training was designed and implemented for medical professionals on the development of operational procedures, and measures to be undertaken by the meteorological and health sectors during heat waves. A range of publicity materials for health education and promotion was developed. The project implemented a significant training and capacity-building component over the 5-year project period to improve the capacity of the health system and communities to respond to heat-related health effects.

- ▶ Medical professionals in the communities were trained on health risks during climate extremes, and prevention and response measures (through workshops, seminars, exercises and drills).
- ▶ A training workshop on the development of an EWS was held in 2013. The workshop was organized by the Institute for Environmental Health and Related Product Safety, CDC China. The training introduced the design and framework of the EWS, as well as the workplan, detailed implementation plan and guideline for multilevel responses to health risks from heat waves. Representatives from each pilot city were also familiarized with the software.
- ▶ In 2014, an intercountry seminar was held in China on EWS for health; the main purpose was to share experiences among the seven countries implementing this project.
- ▶ Special awareness-raising sessions and lectures on heat waves and health were organized in communities (Photo 1).

## Outcome 3

### Adaptation capacities improved and emergency medical plans implemented for cases of cerebro- and cardiovascular diseases during heat waves

Under Outcome 3, a heat wave EWS with an application software and health protection measures was developed and implemented in four pilot sites. The effectiveness in decreasing heat-related mortality was monitored. Several components were included:

- ▶ An emergency plan and support systems were established for vulnerable population groups and high-risk individuals in the project sites.
- ▶ A disease surveillance system for heat-related health risks was set up (Photo 2).
- ▶ Public awareness was raised through a coordinated media campaign. These included:



**Photo 2: Using health records of community residents to establish a baseline for surveillance of the health impacts of heat-stress with instruction from the local Centers for Disease Control and Prevention office in China (UNDP/WHO GEF project)**

- Videocasts with health education lectures, and regular updates of health education and consulting services in communities and schools;
  - Posters or bulletins on heat waves and health were put up in pilot communities, hospitals, community health service centres, bus stations and electronic screens;
  - Several activities such as a drawing and writing competitions on heat wave and health in the third, fourth and fifth grades of pilot primary schools; and lectures on heat wave and heat stroke. Teaching materials included videos, specific blackboard newspapers and posters displayed on the school bulletin board. Teachers were trained in health prevention measures to be taken during heat waves. A baseline knowledge, attitude and practices (KAP) survey of community residents and primary school students was conducted.
- A “propaganda day” was organized to spread knowledge on health protection during heat waves (through brochures, folders, etc.).
- A consultation station was set up to provide free consultation for residents on heat stroke prevention.
- The provision of knowledge on health protection against heat waves was integrated into the follow-up visits of chronic disease patients.

### Lessons learned

- » Strengthening multisectoral cooperation mechanisms proved to be really important for project implementation and sustainability.
- » Capacity building and training should be continued beyond the project period in order to strengthen the outcomes.
- » More agencies besides the Environmental Protection Bureau and the National Meteorological Bureau should be involved in order to scale up the EWS.

### ***Efforts to ensure sustainability of the structures and measures***

- Efforts to implement and constantly update the heat EWS and related public health responses should be sustained to ensure continuity of the project outputs and activities beyond the project phase.

### ***Opportunities to scale up***

- The heat wave EWS and health protection measures were successfully implemented in four pilot sites and the system, together with the experiences, can be replicated in other cities.
- Integration of the EWS into the public health emergency system of the country was recommended, which will ensure the sustainability of this project in the future.

### ***Key products***

Key products that may be of interest to other regions or countries include the following:

- Heat wave EWS with application software
- Software modules for a heat-related health risk EWS
- Guidelines for multilevel responses to the health risks of heat waves (unpublished)
- Educational materials for health professionals and the public
- Communication and promotional materials
- Video (available online: <https://www.youtube.com/watch?v=QQoZUjEvNJE>) to highlight the health risks of heat waves, development of the heat wave EWS, and how the system can reduce the health burden of heat waves.



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### **Public Health & Environment Department (PHE)**

Health Security & Environment Cluster (HSE)

World Health Organization (WHO)

Avenue Appia 20, CH-1211 Geneva 27, Switzerland

[www.who.int/phe/en/](http://www.who.int/phe/en/)