Climate change adaptation to protect human health

BHUTAN

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

Project background

The "Climate change adaptation to protect human health" 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".

Bhutan at a glance

Bhutan is a landlocked, mountainous country in the eastern Himalayas in southern Asia, sharing borders with China and India. The country stretches across three climatic zones: the southern belt has a hot, humid climate, with temperatures remaining fairly even throughout the year and with significant rainfall; the central inner Himalayas have a cool, temperate climate with average rainfall; and the higher and more northern region has an alpine climate, with less rainfall.

Climate change and health in Bhutan

The fragile mountainous ecosystem of the eastern Himalayas is particularly affected by climate change. Rising mean temperatures are the main projected change in Bhutan, as a higher temperature rise is projected in mountainous areas than elsewhere in the world. A wide range of health risks associated with these changes is also projected to increase. Some of the increased risks are given below:

- The probability of glacial lake outburst floods (24 of the estimated 2674 glacial lakes in Bhutan are considered potentially dangerous);
- The risk of flash floods and landslides during the monsoon period of June to August;
- The geographical range and incidence of vector-borne diseases, particularly malaria and dengue. Dengue is an emerging infectious disease in Bhutan; it was first documented in the country in 2004 and is now endemic during the monsoon period;
- The incidence of waterborne diseases due to drying up of water sources or contamination from flooding (diarrhoeal diseases already contribute to about 10–15% of the burden of morbidity).

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Objectives of the Bhutan project

The specific objective of the project was to strengthen national capacity to identify and prevent adverse climate change-related health outcomes in Bhutan.

The main expected national benefit from this project was a robust evidence base for climate change and health, and enhanced awareness and capacity of health workers, policy-makers and the community at large.

The Department of Public Health of the Ministry of Health was the principal executing agency and the Environmental Health Programme (EHP) was the central coordinating unit for implementation. The EHP collaborated with other climate-sensitive programmes and units from within and outside the Ministry and implemented the project activities. The project had a multisectoral Project Steering Committee (PSC) comprising representatives from relevant agencies to guide the project and advise the project management and implementation teams.

Main outcomes and outputs: climate change adaptation in Bhutan

The three global outcomes defined for the global project on "Piloting Climate Change Adaptation to Protect Human Health" were adjusted slightly to the specific context of Bhutan and its identified health risks related to climate change. Working towards these outcomes, Bhutan specifically focused on:

- Assessing the country's vulnerability and developing baselines to understand the health impacts of climate change and the adaptive capacity. Better information, data collection and surveillance of climate change-related health risks in Bhutan were expected to improve early warning, preparedness and response to potential health risks;
- Increasing the capacity of health professionals for assessing the impacts of climate change, climate variability and extreme weather events on the transmission of vector-borne diseases and other health effects;
- Increasing communities' capacity to prepare for and cope with the increased stresses posed by climate change or emergencies through awareness-raising and capacity-building activities.

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

- Insufficient national capacity in terms of human and financial resources for incorporating climate change risks into all levels of health sector activities, and national climate change plans and processes
- Limited meteorological data and sparsely located meteorological stations
- Limited surveillance for climate-sensitive health outcomes, resulting in insufficient data and lack of awareness of the possible health impacts of climate change across all government sectors, including health
- Lack of consideration of climate change in national programmes dealing with climate-sensitive diseases (CSDs) such as the National Vector Borne Disease Control Program (VBDCP), acute respiratory infections (ARI) and diarrhoeal disease programmes, Water, Sanitation and Hygiene (WASH) programme;
- At the outset of the project, none of the district health managers (15 respondents) considered their existing response plans to be effective in dealing with climate-sensitive health risks; and 100% considered that interagency and intersectoral barriers prevented effective responses. This perceived vulnerability considerably decreased by the end of the project.

Solutions

- A new Environmental Health Programme was developed by the Ministry of Health to coordinate and implement climate and health initiatives.
- The EHP works closely with climate-sensitive public health programmes, especially the VBDCP, in sustaining programme capacity and evidence for vector-borne disease control activities, and with the WASH Programme for rural water quality and community sanitation.
- A national-level multisectoral Technical Committee on Climate Change was created and is engaged in climate change issues. The Committee works across sectors to help align adaptation activities with overall development goals.
- Better coordination and cooperation with the Department of Hydro-meteorological Services was strengthened in order to collect, deliver and analyse health-relevant meteorological information.

Outcome 1

Risk assessment and integrated surveillance were enhanced for effective management of climate-sensitive health risks

In the frame of this project, baseline conditions with regard to health outcomes and capacity were established in a risk assessment, and integrated surveillance of CSDs was strengthened. Additionally, further steps were taken towards developing a climate-related early warning system (EWS) for health.

a) National vulnerability and adaptation assessment on health outcomes of climate change

- The baseline conditions of health outcomes were established.
- The capacity of the health and other sectors to manage the risks due to climate-sensitive health outcomes was assessed.

b) Integrated surveillance for CSDs

At the outset of the project, Bhutan collected and reported data for dengue, though without correlating them to climate data. Integrated surveillance for CSDs was piloted along one of the high-risk riverine valleys (Punatshang valley) at six health facilities in four districts. The surveillance focused on monitoring the risk factors (temperature, humidity and rainfall) along with routine epidemiological surveillance for CSDs (diarrhoea, ARI, malaria, dengue, Japanese encephalitis [JE] and kala-azar). In addition, relevant environmental variables (non-climatic variables that are greatly influenced by climate variables), such as water quality, water quantity and vector density, were monitored to provide better information on climate change-related health risks. Improved data collection through the integrated surveillance system allowed the health sector to monitor and receive early warnings and thus the opportunity to prepare and respond to potential health risks. Establishing the surveillance system was envisaged to be a continuous process and was one of the pre-requisites for designing and implementing a climate-related EWS for health.

c) Early warning system for health

Bhutan has adopted six steps in designing an EWS for CSDs in close collaboration with the Department of Hydro-meteorological Services (Fig. 1). In the frame of the UNDP/GEF/WHO project, steps 1–3 in the process have been completed and step 4 has been initiated and will continue after the end of the project. While data collection covered various CSDs, diarrhoeal diseases were selected as an initial focus for data analysis, modelling and validation of the models.

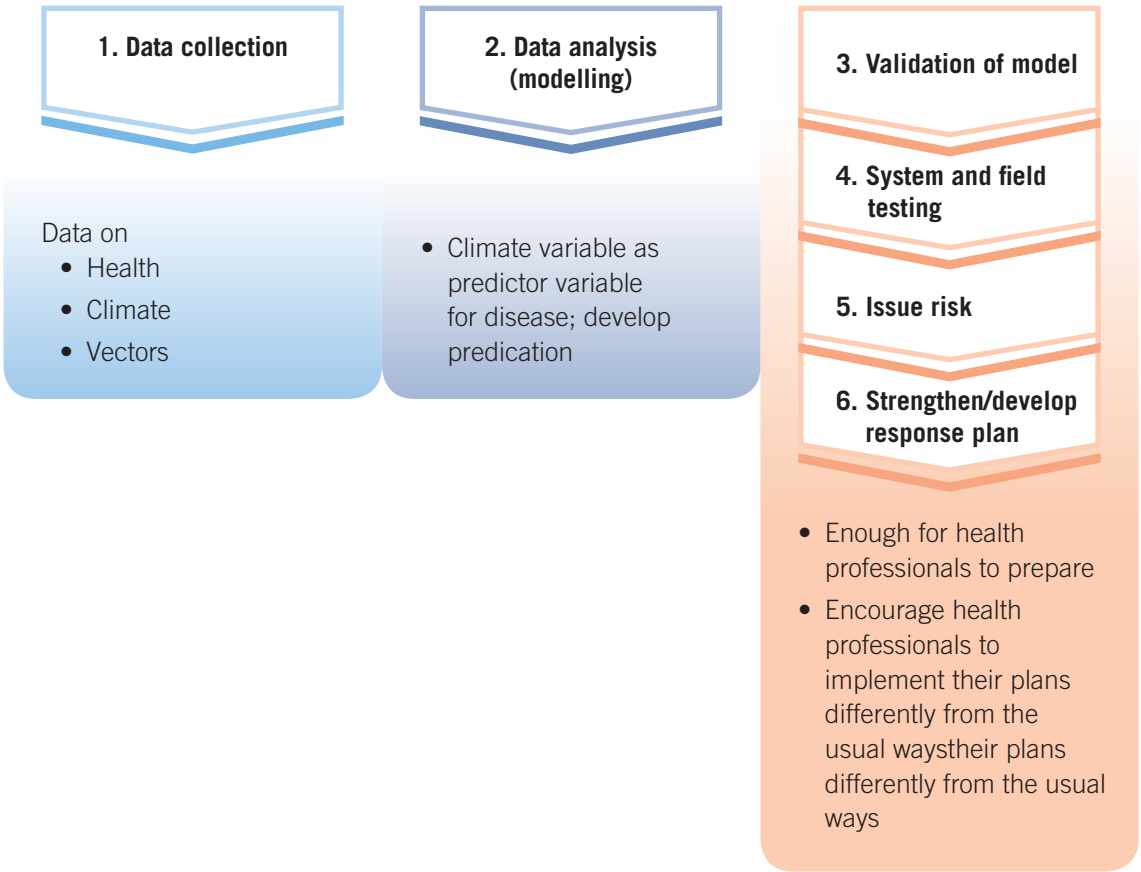

Fig 1: Process for early warning system for climate-sensitive diseases in Bhutan

- Various types of data were collected to develop the models for the EWS (step 1):
  - Daily cases of diarrhoea, ARI, malaria, JE, kala-azar and dengue (2003–2014)
  - Meteorological data: daily and monthly rainfall, temperature and humidity (2003–2014)
  - Monthly entomological data through vector surveillance.
- Time series regression/analysis was carried out and models for diarrhoea were developed for six Basic Health Units (BHUs):
  - Generalized additive model (GAM) for studying association
  - Generalized linear model (GLM) for prediction.
- Models were validated through comparing observed versus predicted diarrhoea incidence (step 3, see Fig. 2). The aim was to further improve the predictive power of the models over time.
- The health risk index for diarrhoeal diseases was calculated as the predicted number of cases over the average number of cases in summer to be used for early warning. Other options for generating warning information are being explored.

Once warning thresholds for diarrhoeal disease risk are defined, the EWS will be further developed with support from technical experts of the Ministry of Health. Once the EWS for diarrhoeal diseases is fully developed, it will be field-tested (step 4) and validated, involving health professionals from the six BHUs. Figure 3 shows the template designed for the EWS.

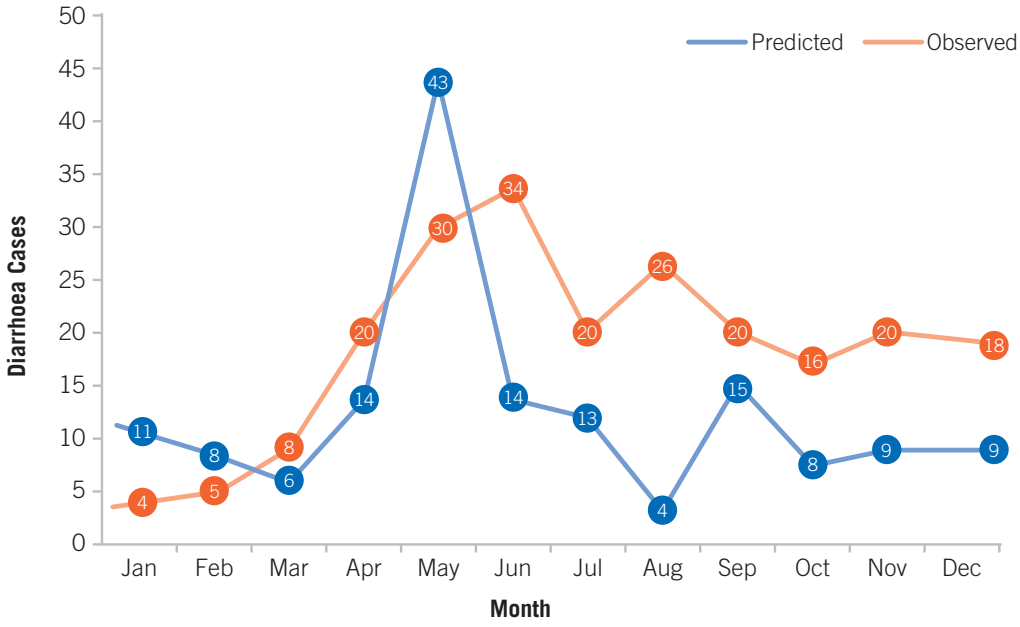

Fig 2: Model validation: warning for 2013 from the model at Lhamoizingkha

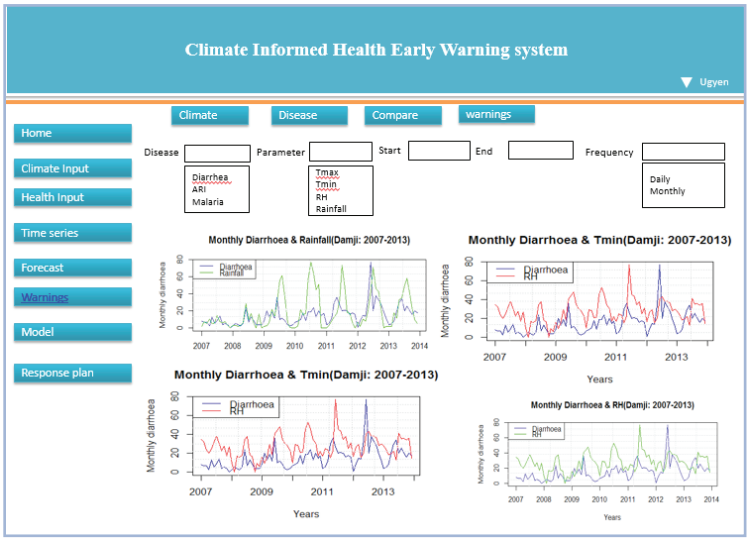

Fig. 3: Template for the climate-informed early warning system for health in Bhutan

Outcome 2

Community and health sector institutions have improved capacity to respond to climate-sensitive health risks

Under Outcome 2, the project had three outputs. A series of activities supported these three outputs designed to build institutional, professional and community capacity for climate change adaptation to protect human health. This involved capacity development of policy-makers, academia, health professionals, village health volunteers and community groups.

a) Professional skills and health system strengthened in areas identified to have higher risk of extreme weather events or disasters, and epidemic diseases by providing training, capacity-building and institutional support

- An "Environmental health and climate change module" was developed and incorporated in the curriculum of pre-service health workers at the Faculty of Nursing and Public Health. The project also supported and purchased reference books on environmental health/climate change for the students.
- Health professionals working at the central level attended short-term training on climate change and health outside the country. A team of professionals was trained in Public Health Management in Disasters and Emergencies. The trained personnel were expected to further train the emergency medical team in the country. Water engineers were trained on water source and quality needs related to climate, and on alternative use of appropriate technologies.
- Representatives from Bhutan attended an international training course on agricultural reuse of treated wastewater held in 2014 in Amman, Jordan through the UNDP/WHO/GEF project.

b) Strengthened awareness of the relevance of climate to health among national policy-makers, and multisectoral coordination for improved effectiveness of prevention, monitoring and management of health risks.

- The project contributed to improving the capacity of the Ministry of Health with regard to health information, enhanced knowledge and ownership.
- High-level advocacy among national policy-makers was carried out and awareness of the relevance of climate to health was strengthened among national policy-makers and communities (Photo 1).
- Coordination was strengthened with the Meteorological service for collecting, delivering and analysing health-relevant meteorological information. The project supported procurement of small equipment for meteorological stations (Class C), and offered training on the use of climate data for public health interventions.

c) Increased community awareness, capacity and empowerment to prepare for and cope with the increased stresses posed by climate change or emergencies

- A workshop on reducing the public health risks from climate change was conducted for 40 local leaders and 41 other participants, including District Environment Officers, District Health Officers, and District Agriculture Officers from all 20 districts. The workshop covered the health risks associated with climate change and adaptation measures for managing these risks, including effective management of disease outbreaks.
- Awareness and capacity were increased among local leaders, village health workers and school health coordinators, and they were empowered to help communities prepare for and cope with the increased stresses posed by climate change or emergencies. Information, education and communication (IEC) materials were prepared for awareness-raising activities, including a video documentary on climate change and health. Educational materials were also developed for all levels of health care, including village health workers. Pre- and post-training knowledge tests and meetings were conducted with district health managers, BHUs and village health workers.

Photo 1: High-level advocacy for climate change and health in Bhutan

Photo 2: Vector surveillance

Outcome 3

Emergency preparedness and disease prevention measures implemented in areas of heightened health risk due to climate change

A range of adaptation measures was implemented to prepare for and prevent climate-related health effects and diseases. The focus lay on reducing the risks of vector-borne and waterborne diseases related to climate change.

- Vector surveillance was carried out in non-endemic areas and vector maps were generated.
- Health professionals working in non-endemic areas were trained on case diagnosis and management of climate-sensitive vector-borne diseases. After the training workshop, rapid diagnostic kits for malaria, dengue and kala-azar were procured with support from the project and distributed to six BHUs.
- A small group exercise was carried out to identify the current health vulnerabilities to climate change in each district. Small community-based adaptation plans were developed for the respective districts on the basis of the identified vulnerabilities. The community adaptation plans were considered in the development of the climate change and health strategy.
- The standard operating procedures (SOPs) for drinking water and sanitation during emergencies were finalized and submitted to the Emergency Management Programme in the Ministry of Health to further discuss and seek final approval from Department of Disaster Management prior to printing.
- A spring shed development approach has been implemented to revive drying springs in one of the most water-stressed areas of Bhutan (Khamdang and Thedtsho gewogs in Trashiyangste district).

Lessons learned

» Strengthening collaboration between the Department of Public Health, Ministry of Health, the Environmental Health Programme and relevant stakeholders such as the meteorological services proved to be very efficient for implementation of the project, as high-level support was built.

» Further capacity-building activities should be conducted for the project management team before a similar project is initiated in the future.

» Top–down and bottom–up adaptation strategies should be integrated.

» Further research on the links between climate change and health is needed and the use of research results should be encouraged. Further dialogue between policy-makers and the research community should be promoted if effective health protection from climate change is to be implemented.

Efforts to ensure sustainability of the structures and measures

In Bhutan, several actions were taken to ensure the sustainability of implemented project activities and outputs:

- Climate change was incorporated into the Sectoral Five-Year Health Plan where response to the health impacts of environmental risks were strengthened, including those exacerbated by climate change.
- Close collaboration with the National Environment Commission was set up to consider health as a priority across sectors.
- A comprehensive Environmental Health Strategy was developed and climate change was included as a key area.
- An environmental health and climate change module was developed and incorporated in the curriculum of pre-service health workers at the Faculty of Nursing and Public Health in Bhutan.
- Funding opportunities were explored with environment and conservation NGOs in Bhutan.

Opportunities to scale up

- Integrated surveillance will be expanded to other high-risk riverine areas for effective monitoring of CSDs.
- The spring shed development approach is a simple way to revive drying springs in water-stressed areas. It can be replicated in other water-stressed areas in the face of the increase in the erratic rainfall pattern experienced by the country.

Key products

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

Training module: Environmental health and climate change, study material

IEC materials:

- Brochure: Climate change and its impact on human health; issued by the Environmental Health Programme, Department of Public Health, Ministry of Health, Bhutan
- A series of posters presenting the project results:
  - Integrated surveillance and climate – health early warning system
  - Awareness and sensitization on climate change and health
  - Climate-resilient sanitation system
  - Climate change adaptation for water, sanitation and hygiene

All the above were issued through a collaboration between the Department of Public Health, Ministry of Health and Department of Hydro-meteorological Services, Ministry of Economic Affairs, WHO, UNDP and GEF.

- Climate change and its impact on human health; Health Promotion Division, issued by Environmental Health Programme, Ministry of Health, WHO
- Final report: Assessment of health vulnerability and adaptation to climate change
- Video documentary on climate change and health

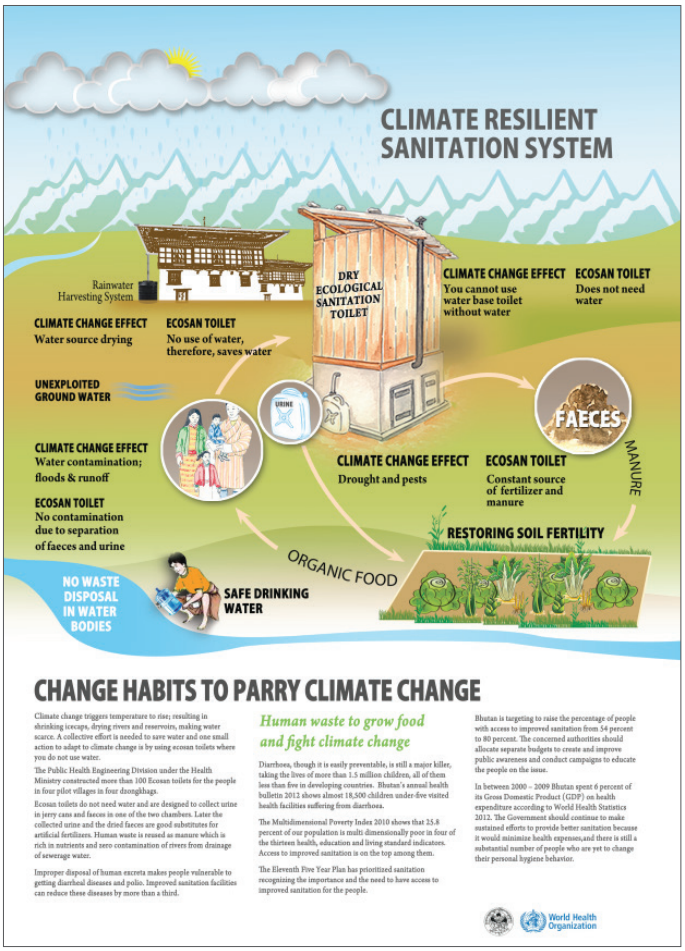

Fig. 4: Poster promoting a climate-resilient sanitation system (Department of Public Health, Bhutan)

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