Health Risk Management

in a changing climate

Red Cross Red Crescent Climate Centre

Silas Liech, a Kenya Red Cross Society volunteer, and eight-month old Daren Onunga. Children are most endangered with the diarrhoea outbreaks that the Red Cross HRM project, funded by the Rockefeller Foundation, was designed to address in Kenya and three other countries. Daren's chances of infection have been reduced after his parents received information on how to use simple water-treatment methods.
(Photo: Nancy Okwengu/Climate Centre)

RESEARCH suggests climate change and variability are affecting global disease-patterns, but little has been done to integrate climate information with humanitarian response and health programmes – or even show how this might be possible. Now a unique Red Cross Red Crescent project, funded by the Rockefeller Foundation, has explored ways of integrating climate with health programming in Indonesia, Kenya, Tanzania and Vietnam, approaching the issue from three angles: the priorities of communities; integrating climate factors with operations themselves; and reducing risk. Experience now suggests climate information can usefully be built into regular public-health work to take account of changing risks.

Introduction

Climate – temperature, rainfall, humidity – affects the geographical and seasonal distribution of many diseases. Demographic changes and increased global travel, urbanization and other environmental factors are also relevant. Public health programmes will now have to prepare for greater uncertainty about disease patterns that are also affected by human behaviour and other factors. The humanitarian and development communities acknowledge this, but there has been very little in the way of *programme action*.

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Innovation for the Next 100 Years

Vietnamese Red Cross HRM volunteer Pham Thi My Dung keeps and eye on Truong Thi Hoa, 88, who lives alone in sheltered housing in Ben Nghe ward. HRM in Vietnam produced more than 20 instructors skilled in techniques to prevent dengue fever, as well as 400 volunteers in the community to work as first responders for public health. (Photo: The Anh/Vietnamese Red Cross-Climate Centre)

The Health Risk Management Project ("the project") addresses this gap by selecting two diseases that involve contrasting interactions between climate and health: diarrhoeal disease in Kenya and Tanzania and dengue fever in Indonesia and Vietnam. It was implemented by the National Societies of those countries in conjunction with the International Federation of Red Cross and Red Crescent Societies (IFRC).

Dengue (haemorrhagic) fever, which has increased dramatically in recent decades, is transmitted to humans by mosquitoes that thrive in hot, wet conditions. Diarrhoeal disease is clearly related to rainfall, floods and droughts – all of which increase the chances of people's water sources getting contaminated.

Such disease outbreaks already represent a significant portion of humanitarian work: in 2012, the Red Cross Red Crescent worldwide responded to nearly 20 outbreaks, or seasonal peaks, of cholera and seven of dengue fever. There's concern that climate change will increase this burden, but less certainty about how to integrate these considerations into health programming; about what to "do differently", in other words.

The project has sought to reduce disease risk in areas of four countries – Indonesia, Kenya, Tanzania and Vietnam – with education campaigns, improved coordination for early detection through local committees, climate-informed contingency planning, disease prevention and strengthened partnerships.

The East Africa project story

In 2010 in East Africa, diarrhoeal diseases are estimated to have caused nearly 9 per cent of all deaths of children under five, or some 90,000 in total, according to the US Institute for Health Metrics and Evaluation in Seattle. Climate change is predicted to increase the risk of diarrhoeal diseases by 23 per cent in Equatorial Africa by the end of the century, based on model projections for temperature and precipitation (Kolstad and Johansson, 2011).

In Kenya the project sites were located in Nyando province, near Lake Victoria – an alluvial plain vulnerable to endemic malaria, devastating floods and diarrhoeal disease. In Tanzania, projects were undertaken in coastal Tanga province – one of the country's most densely populated regions where diarrhoeal disease and malaria are common.

Public health programmes will have to prepare for greater uncertainty about disease

In East Africa, once-consistent rainfall patterns are shifting, and this could have significant implications for disease, creating more larval habitats for mosquitoes, washing pathogens into water sources and disrupting sanitation. The project sought to introduce "Early Warning, Early Action" systems into targeted regions of Tanzania and Kenya, allowing community-level interventions for malaria and diarrhoeal disease and reducing human vulnerability through the use of climate information.

Kenya | 60,000 people reached

Based on an "endline" (final) analysis of project sub-locations, 11 villages in Magina and Gem Rae, Nyando district, water and sanitation facilities were improved after project work by the Kenya Red Cross Society (KRCS) to raise awareness of hygiene and hygiene practice. For example, beneficiaries learned better techniques for constructing pit-latrines. Information on early warning for health promotion was also disseminated; one endline survey showed the proportion of respondents receiving early-warning information had risen to 87 per cent from 69 per cent.

School- and community-led total sanitation (CLTS) training by KRCS volunteers was conducted in communities where

Nature sounds the alarm:
traditional early-warning signals observed by residents in Gem Rae and Magina, Kenya

Dry season	Flood season
Strong, cold wind	Cloudy with variable wind
Constant sun	Sea breezes
Grasshopper swarms	Change in river colour
Butterflies	Rising river-levels
Onyoso termites	Loud frogs
	Red ants
	Ogongo, *okok* and *kwasi* birds

(Note: combined HRM household and focus-group surveys.)

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HRM in Kenya: **a volunteer's story**

Three years ago, Pamela Akinyi Aroko, 40, who chairs her local early-warning committee, watched death come to her village, Kosano. It started with an elderly man, then two children died of acute diarrhoeal sickness. She knew the problem lay with contaminated drinking water in the floods that followed heavy rainfall.

Pamela (*pictured right*) felt she owed it to her children to volunteer for the community-led total sanitation (CLTS) committee; they were prone to diseases such as diarrhoea, cholera, eye infections, rashes and malaria. Through the help of the Red Cross Health Risk Management Project (HRM), communities have been trained on climate impacts and their effect on health, as well as the early warning systems that can reduce exposure to disasters.

Early-warning committees received severe-weather warnings several days before floods and organized the maintainance of drainage channels, repair of latrines, storage of food and water,

'The best gift is to build someone's capacity to handle a challenge'

and the gathering of supplies for boiling water. Now life goes on as usual; women go to the farm; men cycle to work; children play.

"We are not caught unawares," says Pamela. "Yes, we know that floods are coming but also that we have taken the necessary measures to ensure we are safe."

Pamela has led teams to dig canals and trenches around homes, directing any excess water in the direction of the River Awach. That way their plots are not flooded and crops are preserved, warding off food insecurity for another season. Together with Kenya Red Cross Society (KRCS) volunteers, she has also led her community in identifying raised ground that can be used as evacuation areas.

KRCS megaphones purchased by the project are also ever-ready, and volunteers have been trained how to use them and what messages to pass across during evacuation. "Information has saved lives in this community," she says.

People now combine traditional ways of sharing early-warning signs through, for example, chiefs' meetings with modern communications: the Kenyan met office's Nyando branch has bought land to set up a radio station to give climate information in the local language, Luo. "The best gift you can give someone is to build their capacity to handle a challenge," says Pamela.

The CLTS committee engaged women and youth in an income-generating project to build modern toilets. "Using the materials at our disposal like wire mesh, cement and bricks, we can put up a modern latrine that can withstand floods at a cost of 20 US dollars," she explains. When the baseline survey showed some people in Gem Rae and Magina lacked latrines, the project helped the KRCS and the health ministry together to expand coverage to very nearly the entire community.

by Nancy Okwengu

Mary Atieno (right), 32, brings her daughter Alice, 5 months, and year-old niece Michelle for a malaria test at the Katito health centre in Gem Rae. They both had temperatures overnight. "I suspect malaria because they recently failed to sleep under nets while visiting a relative in a village where there has been an outbreak of malaria," says Mary. But after training by Kenya Red Cross Society volunteers she knows how to detect early symptoms and rushed the children to hospital. Community knowledge on disease prevention and management increased with Red Cross malaria and HRM programmes, and lives are saved.

(Photos on this page: Nancy Okwengu/Climate Centre)

What people in HRM project countries think is happening to their climate

Kenya	Tanzania		Vietnam		Indonesia	
Changes to seasons, irregular rainfall, worse floods and droughts	More drought	77%	Seasons changing	85%	Seasons changing	83%
	Shorter rainy season	77%	Hotter overall	60%	Hotter dry season	39%
	Hotter	66%	More floods	48%	Rainy season later	18%

(Source: HRM community surveys; anecdotal results only from Kenya.)

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people have learnt (through painful experience) that being prepared can save lives in the context of a harsh and possibly changing climate. Information received through the project and local media provided community members with good knowledge of the flood danger, and allowed them to take simple preparedness measures.

From the outset, the KRCS integrated project work with *existing* diarrhoeal prevention materials used by health officials working on local programmes with communities in Nyando. Public health officers facilitated training as well as monitoring and evaluation of hygiene and sanitation work. During the project period, 260 community members and 50 Red Cross Nyando branch volunteers underwent CLTS training.

The Red Cross developed a contingency plan based on information monitored by the community that includes seasonal and weather forecasts from the meteorological department as well as traditional warning signs for the onset of floods and dry seasons (*see box, page 2*). The prevalence of diarrhoea and malaria before, during and after floods was monitored, and early-warning committees helped people record traditional triggers for early preparation. Information flow-charts were developed to illustrate the dovetailing of traditional and modern early-warning.

Tanzania | 90,000 people reached

Like much of East Africa, the project's Tanzania area, the Tanga region, is expected to warm this century, particularly in June, July and August, and average rainfall is likely to increase across the seasons, with implications for malaria and diarrhoeal disease. Vulnerability and capacity assessments conducted by the Tanzania Red Cross Society (TRCS) revealed that preventing malaria and diarrhoeal disease is a priority for Tanga residents: when asked to identify the major health risks they faced, all four villages where the project was implemented mentioned these and water shortages.

A baseline survey showed residents associated both diseases with the rainy season. Malaria prevalence follows the two rainy seasons, increasing in May and then again in November; but with climate change, these rainfall patterns may shift, causing disease patterns to shift too. It was critical to adopt *seasonal* intervention strategies that can be adapted in response to forecasts. To control malaria, efforts were needed in both vector control (environmental cleaning and bed nets) and case management (early treatment).

Hygiene practices are critical to preventing diarrhoeal disease outbreaks: water treatment, hand washing and latrines are vital. Crucial to all these strategies is *education*. The Red Cross strategy was to emphasize the "climate-smart" aspect of the work: the TRCS Tanga branch regularly monitors seasonal and weather forecasts, using the websites of both the local met office and the International Research Institute for Climate and Society, an IFRC partner. An action plan, built around seasonal fluctuations in disease, was adapted to unusual weather patterns and includes four volunteer meetings each year – at the beginning and end of each rainy season.

Volunteers are warned of coming rainfall and provided with appropriate community-level intervention strategies, including environmental cleaning (cutting grass, emptying

The local reach and risk-reduction experience of the Tanzania Red Cross Society made them ideal implementing partners for HRM. Like much of East Africa, the Tanzanian HRM project district, Tanga region, is predicted to become warmer this century and average rainfall should increase, with implications for health issues like malaria and diarrhoeal disease. (Photo: Alex Wynter/IFRC)

April 2004: a dengue epidemic in Indonesia affected tens of thousands of people and killed several hundred. Children at the Duren Sawit Junior High School in East Jakarta took part in an environmental clean-up intended to rob mosquitoes of breeding grounds. (Library photo: IFRC)

out any vessels that might collect water), correct use of bed nets, and advice on preventive behaviours for malaria such as attending health facilities as soon as symptoms appear. Water and sanitation strategies were reinforced at the household level, and proper treatment for diarrhoeal disease like oral rehydration therapy was also given.

The South-East Asia project story

Dengue fever is one of the world's most common mosquito-borne diseases, and research indicates clear links with climate variables like El Niño/La Niña–Southern Oscillation, temperature, rainfall, humidity, wind and sunlight; population density and other demographic changes, urbanization, and environmental change are also relevant. Of all the vector-borne viral diseases, dengue is increasing fastest, according to the World Health Organization.

In Indonesia, the programme focused on villages in Jakarta province, which has the highest incidence of dengue fever in the country – nearly 400 cases per 100,000 people and more than twice that of the next highest. The Vietnamese project locations, Ho Chi Minh City and Tien Giang province, both faced an increase in all dengue strains in recent decades.

Indonesia | 248,000 people reached

The project in Indonesia focused on a national-level partnership between the Indonesian Red Cross (PMI)[1] and the health ministry, and core activities with communities were carried out; a baseline survey and assessments were conducted, and educational materials for six target communities were finalized through the involvement of district facilitators, who used them in training sessions over a two-month period.

The PMI facilitators' relationship with the health ministry was strengthened during the project: PMI staff continued working with local experts from the ministry's arbovirus[2] team, and in the use of epidemiological data, identifying the project target area, technical briefings for village volunteers about life-threatening dengue haemorrhagic fever, monitoring community sessions, and developing other educational materials.

The PMI facilitated the development of contingency plans for dengue haemorrhagic fever outbreak that involved government officials from district, provincial and national health offices, and the Indonesian Meteorological, Climatological and Geophysical Agency.

Project surveys indicated an increase in the number of people actively involved in improving environmental conditions, including anti-mosquito work. The number of respondents who said they had "no idea" how to prevent the disease nearly halved from 16 per cent of nearly 400 respondents in 2011 to 9 per cent a year later. A 2012 endline survey showed an increase of people making sure their water containers were covered and did not become stagnant.

[1] The Indonesian Red Cross – Palang Merah Indonesia – is commonly known by its Indonesian acronym, PMI.
[2] Viruses transmitted by mosquitoes, ticks or other arthropods.

The PMI has worked with officials and scientists to develop better contingency planning for dengue – valued by all stakeholders as it encourages the sharing of information between the health and meteorological sectors. The health authorities were able to show dengue peaking when monthly rainfall was between 250mm and 300mm, for example, while the met office provided a picture of minimum, maximum and average incidence alongside monthly rainfall data from 2006–11.

Vietnam | 67,000 people reached

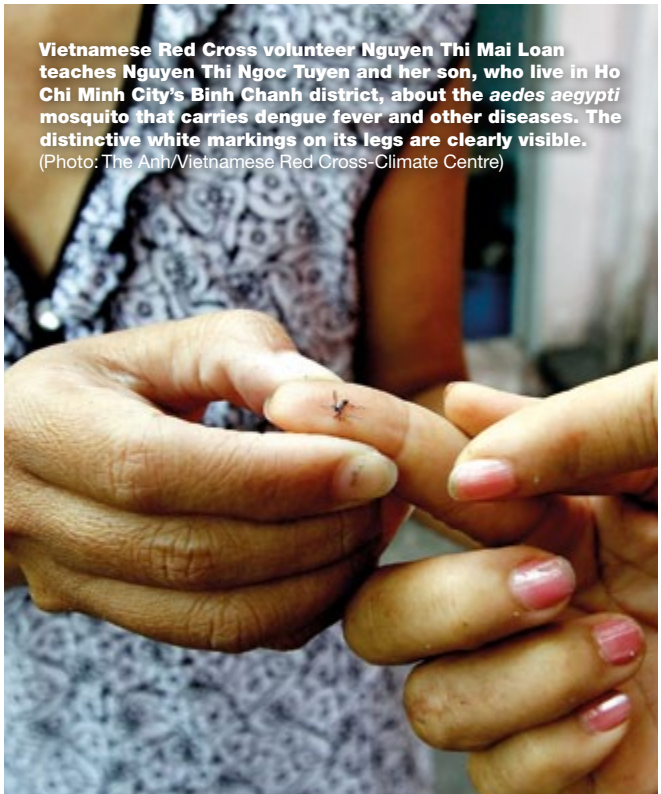
Dengue fever has been a problem in Vietnam for decades, but the rates of both infection and death have been reduced as a result of national efforts in prevention and control, as well as contributions from organizations like the Vietnam Red Cross (VNRC).

In urban areas like Hi Chi Minh City, one of the project areas, factors that contribute to spreading dengue fever include: construction sites – in a booming economy – that provide favourable conditions for mosquito breeding; high population

The Red Cross strategy was to emphasize the 'climate-smart' aspect of the work

density; and the keeping of domestic plants in water-filled vases. In rural areas like Tien Gian province, the other project site, open storage tanks for rainwater and the proximity of canals and rivers increase the dengue risk.

After volunteer training, the VNRC branches in Tien Giang and Ho Chi Minh organized publicity campaigns in 40 communes involving more than 4,000 people, calling for community and household actions to prevent dengue fever. They reached 2,400 primary schoolchildren through group sessions on dengue prevention and climate change. Up to 12,000 families were reached through household visits and follow-ups.



Vietnamese Red Cross volunteer Nguyen Thi Mai Loan teaches Nguyen Thi Ngoc Tuyen and her son, who live in Ho Chi Minh City's Binh Chanh district, about the *aedes aegypti* mosquito that carries dengue fever and other diseases. The distinctive white markings on its legs are clearly visible. (Photo: The Anh/Vietnamese Red Cross-Climate Centre)

Publicity material on dengue fever. (PMI)

Communications activities implemented by Red Cross volunteers were backed up by the distribution of nearly 60,000 printed leaflets for households and school students, and 400 each of flip-charts, volunteer handbooks and banners carrying key messages. Between baseline and endline surveys, there was a significant increase in people stating they knew about climate change through the Red Cross.

The endline survey results show better responses to the symptoms of dengue fever and household action to eradicate breeding sites: more than half the people surveyed in both provinces also said they knew about dengue fever from the Red Cross. Knowledge on how to deal with cases was improved in both provinces; 91 per cent and 83 per cent of people in Ho Chi Minh and Tien Giang respectively said they would try to prevent mosquito breeding.

In a drive for better coordination at local level, a contingency plan was implemented in Tien Giang and Ho Chi Minh in 2011 – a significant improvement on the previous situation when response to dengue fever was organized by Red Cross volunteers only *during* outbreaks. Collaboration with the official health sector in making use of statistics from previous years was maximized by the VNRC in developing the National Society's contingency plan that also included basic climate information.

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