Health Risk Management in a Changing Climate: Using Climate Information to Help Manage Malaria and Diarrheal Disease in Tanzania

LINDSAY BOUTON AND ERIN COUGHLAN
TANZANIA RED CROSS SOCIETY (TRCNS), INTERNATIONAL FEDERATION OF RED CROSS AND RED CRESCENT SOCIETIES (IFRC), RED CROSS/RED CRESCENT CLIMATE CENTRE (RCCC)

INTRODUCTION
The Health Risk Management in a Changing Climate project aims to improve the use of early warning information by implementing community-level health interventions in selected communities throughout the Tanga region of Tanzania. More specifically, the project aims to decrease the risk of malaria and diarrheal disease for about 90,000 beneficiaries in the region, and to improve the capacity of the Tanga branch of the Tanzanian Red Cross Society (TRCNS) to understand and communicate the connection between climate change and health.

The project is funded by Rockefeller Foundation, co-coordinated by the Red Cross/Red Crescent Climate Centre (RCCC), and implemented by the International Federation of Red Cross and Red Crescent Societies (IFRC) and the TRCNS. Activities began in August 2010 and are now nearly complete.

The project has included a wide range of activities: National society staff members participated in a tabletop exercise in which they revisited a historical flood scenario and addressed how climate information could have been used to improve disaster management. They also conducted a baseline survey in target communities to determine local knowledge about climate change and related health risks. Staff members also performed vulnerability and capacity assessments (VCAs) in target communities. They analyzed historical meteorological and health data from the region to inform the development of an Early Warning-Early Action system. They also developed a contingency plan for controlling malaria and diarrheal disease risk, incorporating climate information. They wrote a training manual and trained volunteers on relevant climate change and health issues. Lastly, they developed and distributed Information, Education and Communication (IEC) materials on climate change, health, and community-level interventions for controlling infectious diseases to beneficiaries in target communities.

SOCIOECONOMIC BACKGROUND
Tanga, Tanzania is a city of 298,881 inhabitants, situated on the Indian Ocean very close to the Kenyan border. The major ethnic group in Tanga is Digo, and the major religions are Islam and Christianity. Subsistence farming, fishing, and petty trade form the backbone of economic activity in the district, with the sisal industry being particularly important. The current per capita income is approximately US$230, which is somewhat lower than the country average. The region is quite stable politically, with most residents supporting the current ruling party, Chama cha Mapinduzi (CCM).

Like the rest of East Africa, Tanga will be strongly affected by climate change. Over the next century, the area is predicted to become rainier and warmer, particularly in June, July and August. Average rainfall is predicted to increase in all seasons, with rainfall patterns shifting and becoming less predictable. Increasing temperatures and rainfall have implications for a number of health outcomes, most notably malaria and diarrheal disease. Both of these diseases become more prevalent under rainy conditions, and so extreme precipitation events in the future may trigger disease outbreaks. Vulnerability and capacity assessments conducted by the Red Cross revealed that malaria and diarrheal disease prevention are high priorities for Tanga residents. When asked to identify the major risks faced by their communities, all four villages mentioned malaria and either diarrheal disease or water shortage, which results in diarrheal disease. Additionally, a baseline survey indicated that residents strongly associated both diseases with the rainy season.

Several factors make Tanga particularly vulnerable to the threats of malaria and diarrheal disease. The majority of the residents have only a primary level of education or no formal education at all, and many lack knowledge about climate change and its associated health risks. In addition to this, water and sanitation practices create some serious challenges. A survey of seven of the district’s wards showed that only 85% of residents use a clean water source, and only 84% of households have latrines. Poor health indicators, such as a maternal mortality rate of 398 per 100,000 live births and HIV prevalence of 9.3% also some highlight weaknesses of the health system.

The seven project wards were chosen in order to cover a varied cross-section of the Tanga district. Both coastal and inland communities were included, along with rural and urban/suburban communities. About 90,000 beneficiaries live in this target area and were recipients of IEC materials. The contingency plan was written for the entire Tanga district and will be implemented by the Red Cross Tanga regional branch.

TARGET AUDIENCE
The target audience for this project primarily consists of the Tanga branch of the Tanzanian Red Cross, the Red Cross volunteers, and the target local communities. The Tanga branch serves as an intermediate between information providers and project managers, as well as the Red Cross volunteers and local community members.

1 This project was also carried out in Kenya, Vietnam, and Indonesia.
CLIMATE AND CONTEXTUAL INFORMATION

The Tanga district experiences an average annual temperature of around 27°C, with higher temperatures in December through March and cooler temperatures June through September. Annual rainfall averages about 1100 mm, with two distinct rainy seasons: the "long rains" from March to June and the "short rains" from October to December.

Health records from the district indicate that malaria and diarrheal disease are at least somewhat correlated with this rainfall pattern. Like rainfall, diarrheal disease prevalence increases from March to June and again from October to December. Malaria prevalence lags behind rainfall, increasing in May and then again in November. With climate change, these rainfall patterns may begin to shift, causing disease patterns to shift along with them. This project aims to create a seasonal intervention strategy that can be easily adapted to current weather forecasts. In order to design that strategy, collaboration organizations collected data from a number of different sources.

Background climate information such as regional predictions used for activities like the tabletop exercise was provided by the International Research Institute for Climate and Society (IRI) and the Red Cross/Red Crescent Climate Centre. Other regionally-specific climate data such as monthly temperature and precipitation records from the past ten years were obtained from the Tanzania Meteorological Agency Regional Branch (TMA) in Tanga for a price of 150,000 Tanzanian shillings (approximately US $95). Historical health data such as records of monthly malaria and diarrheal disease cases, was collected at no cost by individual health facilities in the target communities.

At the beginning of the project, background socioeconomic information about the Tanga region was also obtained from national census data in order to help decide what types of interventions would be most appropriate. The Tanzania Red Cross Society, with assistance from the Kenya Red Cross Society, RCCC and the East Africa IFRC regional office (EARO) then collected additional information in May 2011. First, Red Cross staff conducted a baseline survey of 469 families using systematic cluster sampling methodology. The survey included questions regarding education, income source, knowledge about climate change and health, as well as water and sanitation practices. Additionally, Vulnerability and Capacity Assessments (VCAs) focused on disaster risk were conducted in Kiomoni, Mtakuka, Mpirani, and Kibafuta, four of the seven target wards.

Using techniques such as direct observation\(^2\) and focus group discussions, the VCAs identified the histories of the communities, typical livelihoods, perceived hazards and vulnerabilities, and possible coping mechanisms. Working with TRCNS, RCCC members then gathered disease prevalence data from local clinics and rainfall and temperature date from local meteorological stations. This was analyzed, and the results used to formulate a contingency plan for the Red Cross branch in Tanga. At its core, this plan is a seasonal health intervention plan that can be modified based on weather reports. It is also used to manage coordinating work with volunteers.

The Tanga regional branch holds four volunteer meetings each year, at the beginning and end of each rainy season to help volunteers prepare for difficult conditions. On a typical year, these meetings will take place in March, June, October, and December, but these dates can be shifted in the event of unusual rainfall patterns. (If, for example, the regional director observes that the long rainy season is starting early, he will hold the first meeting in February rather than March.) The March and October meetings will likely occur right as diarrheal disease prevalence is increasing and about two months before malaria prevalence begins to increase. At these meetings, the volunteers will be warned of the coming rainfall and provided with appropriate community-level intervention strategies, including:

- Environmental cleaning, such as slashing grass, and emptying out any vessels that might collect water.
- Correct use of insecticide-treated bed nets
- Proper treatment-seeking behaviors for malaria—visiting a health facility as soon as symptoms appear and requesting to be treated with artemisinin combination therapy [ACT]
- Water and sanitation strategies
- Proper treatment for diarrheal disease (oral rehydration therapy)

The June and December meetings will likely occur at the end of the diarrheal disease season and just as malaria prevalence is at its peak. The volunteers will be told to check that their community members have hung insecticide-treated bed nets and that symptomatic individuals are seeking ACT, keeping in mind that children pregnant women are the most vulnerable. They will also continue to reinforce water and sanitation guidelines. They will also be given WaterGuard (water purification tablets) to distribute to their communities while they help implement the above strategies.

INFORMATION TAILORING

Through consultations with TRCNS staff and volunteers, RCCC helped tailor climate information to produce a training manual for Red Cross volunteers. TRCNS carried out training sessions for these volunteers and community members, with the help of local university staff who helped to explain some of the most difficult concepts. Now that the contingency plan is in place, the Tanga Red Cross branch director is responsible for monitoring and interpreting climate information from TMA and IRI’s websites and communicating it to volunteers and community members.

IMPLEMENTATION

PROCESSES AND MECHANISMS

STAKEHOLDER AND ISSUE IDENTIFICATION

Key stakeholders in the project include the Rockefeller Foundation, the Red Cross/Red Crescent Climate Centre (RCCC), the East Africa IFRC regional office (IFRC), the Tanzania Red Cross Society (TRCNS), the International Research Institute for Climate and Society (IRI), the Tanzanian Met Agency (TMA), local health facilities, the Tanga Red Cross branch (TRCNS), Red Cross volunteers, and the people of the Tanga region.

Once the project was initiated, the roles of the various stakeholders were clarified. The Rockefeller Foundation provided the funding, IFRC and the RCCC coordinated the project and provided advice, and TRCNS served as the implementing body. IRI, TMA, and local health facilities all serve as information providers to the project.

---

\(^2\) Direct observation is a useful research tool within the VCA to help understand the context in which the information is being gathered. All members of the VCA team should be constantly taking notes on what they are observing. It is essential to provide as much detail as possible and to describe the circumstances and the context that lead to certain observations. This will allow others to assess the reliability of the information. When carrying out direct observation, you need to confirm that you have properly understood what you observe as it is easy to misinterpret what you are seeing. (Source: VCA toolbox: http://www.ifrc.org/Global/Publications/disasters/vca/vca-toolbox-en.pdf)
Originally, the project focused on early warning for diarrheal diseases, but TRCNS learned through the VCA process that the target communities were much more interested in early warning for malaria, and the project was thus adapted to meet the communities’ needs.

RCCC and TRCNS decided to work on climate and health in the Tanga region because the region was especially vulnerable to climate change, saw significant room for improvement in sanitation and hygiene practices in the region, and had an active Red Cross regional branch that could implement the project. Long-term climate forecasts have played a role throughout the development of this project, from the decision to focus on the Tanga region, to writing the IEC materials and forming of the contingency plan.

**STAKEHOLDER INVOLVEMENT**

Members of RCCC, IFRC, TRCNS, and the Tanga branch collaborated to conduct the baseline survey, prepare and disseminate educational materials on climate and health, analyze historical data, write a volunteer training manual, and devise the contingency plan. Information to support these activities has come from IRI, TMA, and the local health facilities, and has been provided to Red Cross volunteers and the members of the target communities in Tanga. IEC materials printed into pamphlets were distributed to the beneficiaries by Red Cross volunteers in June of 2012. These volunteers had been trained in climate and health and were able to explain the concepts to any beneficiaries who were illiterate or had further questions.

**FUNDING MECHANISMS**

The RCCC secured a grant of $600,000 from the Rockefeller Foundation to support climate and health projects in Tanzania, Kenya, Vietnam, and Indonesia.

Investments have been made in research (the survey, the VCAs, the climate-and-health correlation), human resources (training sessions and the manual) and community education (the IEC materials). There are currently no plans to renew the funding through the same mechanism, but lessons learned are being integrated into other Red Cross Red Crescent health operations.

**MANAGEMENT AND DECISION MAKING**

The project is a collaboration between several different Red Cross groups. IFRC has been responsible for managing TRCNS’s activities, controlling the budget, and facilitating knowledge sharing between national societies such as by giving presentations at conferences. TRCNS has been responsible for implementing and managing the field activities in Tanga. RCCC helps coordinate and has provided technical assistance. As the initial project comes to a close, management of the service will be transferred to the Tanga regional Red Cross branch. They will receive weather forecasts from TMA and IRI and make decisions based on the contingency plan.

**EVALUATION**

The project will undergo a final evaluation, as requested by the Rockefeller Foundation, in the form of a final project report documenting lessons learned, and an independent evaluation of the project. In terms of gathering project evaluation from users, TRCNS has monitored the project continuously and has sought such feedback through meetings with Tanga Red Cross staff, volunteers, and community members.

Key stakeholders in the project include the Rockefeller Foundation, the Red Cross/Red Crescent Climate Centre (RCCC), the East Africa IFRC regional office (IFRC), the Tanzania Red Cross Society (TRCNS), the International Research Institute for Climate and Society (IRI), the Tanzanian Met Agency (TMA), local health facilities, the Tanga Red Cross branch (TRCNS), Red Cross volunteers, and the people of the Tanga region.

Once the project was initiated, the roles of the various stakeholders were clarified. The Rockefeller Foundation provided the funding, IFRC and the RCCC coordinated the project and provided advice, and TRCNS served as the implementing body. IRI, TMA, and local health facilities all serve as information providers to the project.

Originally, the project focused on early warning for diarrheal diseases, but TRCNS learned through the VCA process that the target communities were much more interested in early warning for malaria, and the project was thus adapted to meet the communities’ needs.

RCCC and TRCNS decided to work on climate and health in the Tanga region because the region was especially vulnerable to climate change, saw significant room for improvement in sanitation and hygiene practices in the region, and had an active Red Cross regional branch that could implement the project. Long-term climate forecasts have played a role throughout the development of this project, from the decision to focus on the Tanga region, to writing the IEC materials and forming of the contingency plan.

**CAPACITIES**

**EXISTING CAPACITIES**

RCCC provided the expertise on climate change, while IFRC, TRCNS, and the Tanga branch all contributed expertise on disaster management, health, water, and sanitation. The purpose of the project was to build the capacity of the Tanga branch and the population of the region for managing climate-related health risks.

In the baseline survey, community members demonstrated that many (65%) had heard of climate change, and associated it with changing seasons. The diseases that people were most concerned about were diarrheal disease and malaria. Almost 90% of those surveyed reported an increase in malaria infection during the rainy season, citing that there was an increase in mosquito density as a result of increased breeding sites. Most of the respondents said that both of these diseases would be affected by climate change.

**CAPACITY GAPS**

At the beginning of the project, TRCS staff felt that they needed greater knowledge/capacity in order to be able to work with communities on a climate-related project. This was addressed through a training partnership with a local university, and the creation of a “Climate and Health” training manual for TRCS staff. TRCS was also assisted by Kenya Red Cross on a peer-to-peer visit to help build capacity within TRCS on how to carry out a VCA.

In the baseline survey, community members demonstrated some understanding of “climate change” being associated with changing seasons, but did not understand the mechanism behind this. When asked about the causes of climate change itself, most community members did not think that “greenhouse gases” were involved, but picked either deforestation or burning of fuel as the culprit. Also, many
community members expected that climate change will cause more frequent droughts and shorter rainy seasons, which is not fully in line with climate model projections for extreme rainfall and drought in this region, which mostly point towards wetter rather than dryer conditions including extremes.

LOOKING TOWARD THE FUTURE

GOALS
At the conclusion of the project, both TRCNS and the Tanga regional branch will be better prepared for managing the health risks associated with climate change. The Tanga regional branch should be using an early warning-early action system to help the target communities implement preventative health measures in the case of heavy rainfall.

PROJECT EXPANSION
This approach has fed into the project cycle management within TRCS, and might be expanded in the future. Lessons will also be integrated into wider health programming in the Red Cross Red Crescent.

LESSON LEARNED
Understanding the cultural context of the project site is critical to the success of the project, and communication with so many partners, information providers, and stakeholders can be a challenge. Also, investing resources and time at the branch level can help build up the local volunteer base and sustain engagement. In terms of project management, sustaining community engagement even during unforeseen delays will help transfer ownership to communities so that local groups will continue taking action even after the project is finished. In Tanga, branch resources are very limited, and therefore project implementors developed creative solutions in the branch-led contingency plans to ensure continuation of health activities after the end of the project, even with very little resources. This is an important lesson learned and can be scaled up elsewhere.

This approach has the potential to work in other locations, although the project would have to be adapted to meet the needs of different communities, and new baseline surveys and VCAs would have to be conducted. Lessons learned by RCCC during the process will also inform the organization’s work on a global scale, in terms of community-based action on climate and health, and best practices in contingency planning.
PRINCIPLES OF THE GFCS

Principle 1: All countries will benefit, but priority shall go to building the capacity of climate-vulnerable developing countries.
This project focuses on Tanzania, a climate-vulnerable developing country. However, the lessons learned by RCCC during the process will inform the organization’s work elsewhere as well.

Principle 2: The primary goal of the Framework will be to ensure greater availability of, access to, and use of climate services for all countries.
This project aims to make climate information available to and interpretable by the Tanga regional branch of the Red Cross.

Principle 3: Framework activities will address three geographic domains; global, regional and national
RCCC is establishing this project in the East Africa region, focusing on the Red Cross Society in Kenya as well as Tanzania. Lessons learned by RCCC from this project will inform the organization’s work on a global scale.

Principle 4: Operational climate services will be the core element of the Framework.
The purpose of the project is to enable the Tanga branch to use climate data to prepare for and respond to extreme weather events.

Principle 5: Climate information is primarily an international public good provided by governments, which will have a central role in its management through the Framework.
This project strengthens the connection between the national meteorological service and the people it is meant to serve.

Principle 6: The Framework will promote the free and open exchange of climate-relevant observational data while respecting national and international data policies.
Information gathered in this project will be available to those who need it.

Principle 7: The role of the Framework will be to facilitate and strengthen, not to duplicate.
Information gathered in this project will be available to those who need it.

Principle 8: The Framework will be built through user – provider partnerships that include all stakeholders.
The approach to this project has been consistently participatory, involving the local Red Cross staff and volunteers along with the community from the beginning.