FACT SHEET

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CLIMATE CHANGE VULNERABILITY AND ADAPTATION IN EAST AFRICA

HEALTH, SANITATION AND HUMAN SETTLEMENTS

PHOTO: PREPARED/ TEDDY CHENYA

BACKGROUND

The East Africa vulnerability, impacts, and adaptation assessment (VIA) was undertaken by the East African Community (EAC) with support from the USAID/Kenya and East Africa Planning for Resilience in East Africa through Policy, Adaptation, Research, and Economic Development (PREPARED) Project. The study adopted the Intergovernmental Panel on Climate Change (IPCC) assessment framework and used locally observed climate data and socioeconomic information for a 30-year period (1981–2010). Detailed analysis for the VIA focused on the Lake Victoria Basin (LVB), the largest water body in the region, which is important to farming, fisheries, transportation, and water supply in the five EAC Partner States included in the VIA (Burundi, Kenya, Rwanda, Tanzania, and Uganda).

The VIA developed and demonstrated an approach to integrating adaptive strategies that respond to the risks due to climate change. The assessment contributed to development of the EAC Climate Change Master Plan (2011-2031), which links the EAC's Climate Change Policy, Climate Change Strategy, and Climate Change Master Plan into a vision for a resilient future for East Africa.

This brief captures the major findings on health, sanitation, and human settlements, one of five thematic sectors covered by the analysis in the VIA. It also presents detailed policy actions that were developed based on the findings. The foundational work for the VIA, the current climate baseline and future projections, are presented in the first brief in this series and summarized here.

CLIMATE BASELINE

Data from 1981–2010 indicate a large variance in average annual rainfall variability across the region, with higher variability in the long rains of March-June (MAMJ). In aggregate, the patterns in monthly rainfall suggest that the short rains of October–December (OND) have increased, and the long rains have decreased in the LVB over most of the past century. Overall, rainfall has been declining 20–100 millimeters every 10 years and drier periods are getting longer and more pronounced during the long rains. Wet and dry periods have occurred in distinct 10-year cycles. With regard to surface temperatures, data for 1930–2016 indicate that the average monthly maximum temperature over the LVB has increased +0.7°C to +1.2°C and the average monthly minimum has increased +1.0°C to +1.1°C.

CLIMATE PROJECTIONS

The VIA projections for changes in rainfall and mean surface temperature for 2030, 2050, and 2070 are based on historical and downscaled future scenarios for maximum and minimum temperature data for scenarios representing low, mid, and high levels of emissions and concentrations (RCP2.6, RCP4.5, and RCP8.5). Generally, rainfall is projected to increase over East Africa under all future scenarios except for the June–September (JJAS) period in 2020. Mean annual maximum surface temperature projections increase 1.0°C to 2.0°C over most of the EAC by 2030. The projected warming will be greatest in March–May (MAM) and JJAS, and least in OND. If no mitigating actions are taken, maximum daily temperatures are expected to increase 2.5°C to 3.5°C by 2050. Projections also indicate that East Africa can expect that rainfall and temperature events will become more extreme, episodic, and intense.

KEY FINDINGS

East Africa is within the tropical and sub-tropical climate zone that favors the growth, multiplication, and transmission of several vector-borne and waterborne diseases. These and other communicable diseases contribute to high morbidity, mortality, and disabilities throughout the region. The most common causes of mortality and morbidity are malaria, acute respiratory tract infections, diarrheal diseases, malnutrition, and Human Immunodeficiency Virus/Acquired Immuno-deficiency syndrome (HIV/AIDS). Several of these causes are exacerbated by poor hygiene practices and poor sanitation and most are easily spread through concentrations of human settlement. These factors have already contributed to compromised human health in the region, which will be at further risk with changes and variability in climate.

VECTORS, PATHOGENS AND CLIMATE

Figure 1. Malaria admissions and deaths, Rwanda, 2000–2010

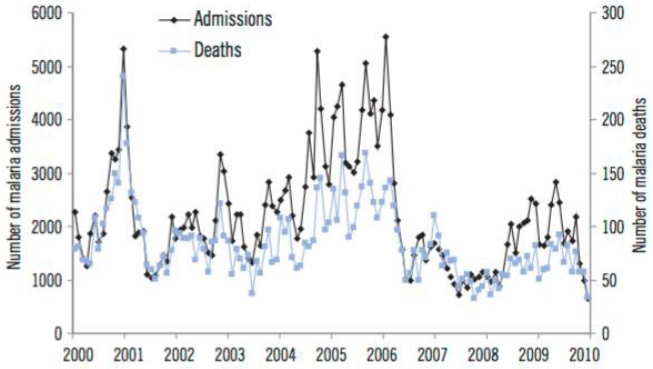


Figure 2. Trends in malaria morbidity and mortality in Rwanda

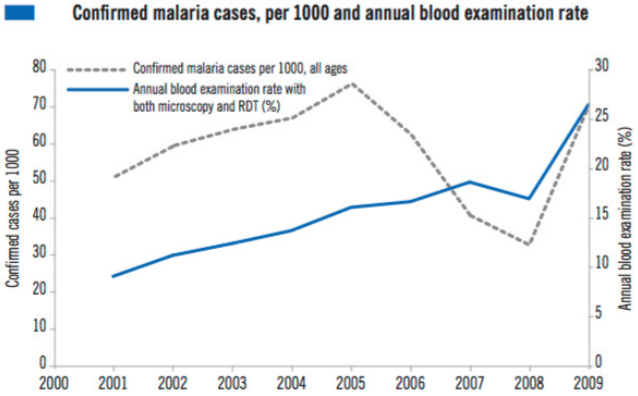
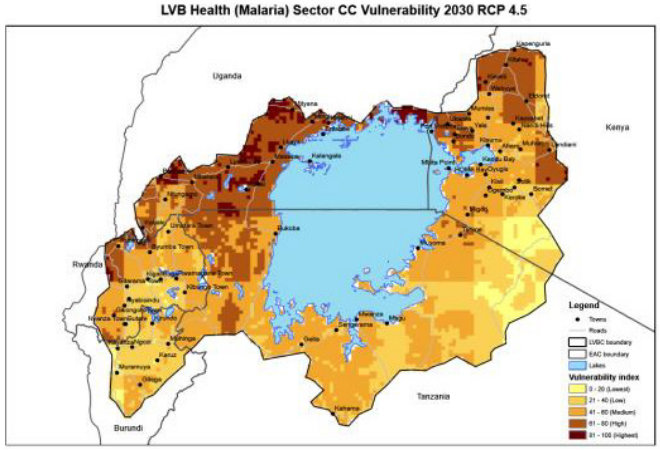


Figure 3. Vulnerability to malaria across Lake Victoria Basin



Vectors, pathogens, and hosts reproduce within certain optimal climate conditions, so changes in these conditions can modify greatly the properties of disease transmission. A changing climate already has altered the ecology of some disease vectors in the EAC region and affected the spatial and temporal transmission of diseases such as malaria, dengue fever, meningitis, and cholera.

MALARIA

Malaria incidence has increased in several areas of the EAC region, including in the highlands. A nationwide seasonal resurgence of malaria cases occurred in Rwanda during the 2008–2009 and 2009–2010 malaria seasons. This was just 2–3 years after a nationwide campaign to provide

long-lasting insecticidal nets for children under 5 years old. The resurgence of uncomplicated outpatient malaria cases was greater than that of severe malaria cases and deaths (Figures 1 and 2).

Studies in the EAC region have shown that a 0.5°C temperature increase could cause a 30–100 percent increase in the abundance of mosquitos, the vector for malaria, while air temperatures below 18°C prohibit development of malaria pathogens.

Projections for 2030, 2050, and 2070 indicate that there will most likely be an increase in malaria cases in the LVB (Figure 3). Due to increasing temperatures, the disease will also be prevalent in areas that were previously free of malaria, especially highland areas. Other projected impacts include prolonged periods of elevated malaria transmission interspersed by periods of low transmission as malaria is highly seasonal and cyclic.

Another feature of the 2030s, 2050s, and 2070s could be the infection of other age groups that are not currently considered vulnerable, such as children over age five.

The potential costs of preventing and treating malaria in the LVB will have to increase to handle the expected increase of malaria cases in the future. For example, in Rwanda an estimated 2.5 million people could be affected in the absence of adaptation measures and the additional burden of endemic and epidemic malaria is estimated at between $61 million and $77 million annually. Initial estimates from a limited number of health facilities in Tanzania indicate that climate change could lead to additional treatment costs of $20 to $100 million by 2030, and $36 to $150 million a year by 2050. In Kabale, Uganda, the cost for treating malaria is estimated to increase from between $0.7 million to $15.8 million in 2010 to between $1.55 million to $41.7 million in 2050.

CHOLERA

The combination of higher temperatures, prolonged droughts, and extreme weather resulting in floods, combined with scarce water resources and poor sanitation make the EAC vulnerable to outbreaks of waterborne diarrheal diseases, including cholera. For example, in the period 1997–1998, an El Niño event brought extreme rainfall and excessive flooding to eastern Africa, which coincided with outbreaks of cholera in Djibouti, Kenya, Mozambique, Somalia, and Tanzania.

Increasing episodic and extreme rainfall events under climate change will create conditions conducive to the ***Vibrio cholerae*** bacterium that causes cholera, as well as to vectors for other diarrheal diseases. ***V. cholerae*** lives in aquatic environments and is linked to both abiotic and biotic ecological factors, which are likely to be influenced by global climate changes and the resulting rise in sea levels. An increase in temperature is a likely factor in expanding the range and increasing the prevalence of ***V. cholerae*** both geographically and temporally.

RESPIRATORY TRACT INFECTIONS

RTIs are a major source of morbidity and mortality for children in East Africa. Pneumonia is responsible for 23 percent of under-five mortality in Kenya, 20 percent in Tanzania, 17 percent in Burundi, 16 percent in Rwanda, and 11 percent in Uganda. Increased rainfall has a strong correlation with the incidence of respiratory tract infections that can lead to pneumonia.

Climate change could increase the incidence of childhood pneumonia both directly and indirectly. One direct effect would be that increased rainfall and higher humidity could increase bacterial survival and virus stability. Indirectly, pneumonia incidence could be affected by increased rainfall, which will increase crowding and exposure to biomass fuel smoke and reduce exposure to sunlight. Crowding will be exacerbated by large-scale population displacement.

WATER, HYGIENE AND SANITATION

The EAC region has made progress in improving access to safe drinking water and sanitation over the past decade. However, future extreme events, such as floods, could lead to increased contamination of safe water sources and a breakdown of sanitation facilities and sewer systems, and droughts will reduce the availability of safe water to ensure the maintenance of proper hygiene.

While spending on safe water and sanitation has increased, it remains low. For example, public health expenditure per capita increased in Burundi from $4.9 in 2012 to $10.6 in 2013, in Uganda from $7.8 to $11.7, and in Kenya from $18.5 to $21. However, these improved positions are still well below the estimated $28 per capita spending needed to achieve the Millennium Development Goal targets.

Access to safe water remains a critical concern. Rwanda has barely improved access to safe drinking water from 74 percent of the population in 2012 to 74.2 percent in 2013, while Uganda reported a slight decline from 71 percent to 67 percent. Access to safe drinking water in urban areas remained high throughout the region (above 80 percent).

HUMAN SETTLEMENTS

The countries of East Africa will be extremely vulnerable to climate changes because they are both susceptible to the changes and, in most areas, already at the limits of their capacity to cope with climatic events. Vulnerable populations include those in low-lying coastal regions and

on islands, subsistence farmers, populations in semiarid grasslands, and the urban poor. Parts of the region that already struggle to cope with exploding populations can be expected to be exceptionally vulnerable to climate change, urban growth, and poverty.

The projections for 2030, 2050, and 2070 indicate that stresses on rural populations are likely to sustain or increase the level of rural-urban migration. Meanwhile, increasing temperatures in cities will put additional pressure on available water supplies and could compromise efforts to expand or even maintain current levels of sanitation control, resulting in increased incidence of disease.

PROPOSED POLICY ACTIONS

Build the capacity of the health workforce on climate change preparedness and response.

- Conduct climate change and health capacity needs assessments of the healthcare workforce in the EAC.
- Develop a framework for building capacity and guidelines for training on climate change and health-related issues.
- Conduct training programs for the health workforce on climate change and health awareness and preparedness and response.

Strengthen and institutionalize surveillance, early warning, and communications systems on climate-sensitive diseases.

- Establish a regional platform for data, information, and knowledge sharing on climate change and health.
- Improve Integrated Disease Surveillance systems by including climate information in those systems.
- Develop and disseminate information, education, and communication materials on climate change and health at all levels.
- Implement programs that use climate appropriate technologies and approaches to support improved climate resilience for health at the community level.

Strengthen research and interventions (prevention, preparedness, response) that address climate-sensitive sanitation and diseases.

- Identify and prioritize key research areas in climate and health at the regional, national, and sub-national levels.
- Mobilize resources for research on interventions that address climate-sensitive sanitation and diseases (public, private, donor, and global funds).
- Conduct research in prioritized key research areas in climate and health in the LVB and use the findings to inform decision-making and programming.

Use climate appropriate technologies for health and sanitation infrastructure.

- Identify and invest in climate appropriate technologies and approaches for health and sanitation infrastructure in the region.
- Assess key health and sanitation infrastructure in the LVB to determine its ability to withstand climate-related shocks and stresses and take appropriate action.

EAST AFRICAN COMMUNITY

USAID
FROM THE AMERICAN PEOPLE

East African Community
EAC Close
Afrika Mashariki Road
P.O. Box 1096, Arusha
United Republic of Tanzania
Email: eac@eachq.org