The implications of climate change for health in Africa

Editorial

The interactions between health and climate change are clearly recognised; the Intergovernmental Panel on Climate Change includes a chapter on health issues in all its publications. But we still need to better understand all the possible impacts of climate change on health.

To date, much of the evidence of the health impacts of climate change has focused on malaria. But the impacts are much wider than this. Climate change projections for Africa indicate that temperatures will increase by 0.2–0.5°C per decade, and many African regions will experience more severe droughts. Eastern areas may experience increased rainfall, and both east and southern Africa may experience a delayed onset of rainfall and shortening of the rain season. This will translate to a short growing season for food crops, thus leading to food shortages.

These changes may affect human health directly, as the changing weather patterns encourage the production of disease vectors and parasites, such as those causing malaria. Indirect changes will result through impacts on water availability, air quality, food quality and quantity, ecosystems, agriculture and economies – all factors that affect people’s health.

The Intergovernmental Panel on Climate Change’s third and fourth assessments (reports on the global state of climate change) suggest that climate change cannot be stopped, despite all the efforts to reduce the further release of greenhouse gases into the atmosphere. We therefore need a greater emphasis on adaptation strategies to protect vulnerable communities from severe health impacts.

We also need to understand health problems in different settings. This issue of *Joto Afrika* features articles from different countries, which highlight ongoing or completed research into climate change and health across Africa. These articles indicate:

- Climate change may increase the prevalence of diseases transmitted between humans and animals.
- Children are most vulnerable to climate change; in times of food shortage, they must be well-fed to avoid malnutrition, as this can make them more vulnerable to other diseases.
- Communities living in areas prone to flooding are often displaced, forcing them to move to temporary accommodation with basic facilities. This makes them more vulnerable to waterborne diseases.
- Modelling is an important tool for early warning for climate-induced health disasters.
- Vulnerable people in communities, for example people living with HIV, can develop successful coping strategies.

Knowledge sharing

Successful adaptation strategies will require research that involves communities, systematic data collection to create a database for predictions, and cooperation across countries. Data sharing and knowledge sharing are particularly important.

Dube and Chimbari (2009) carried out an audit that determines existing research linking climate change and human health in sub-Saharan Africa. A key recommendation was to establish a knowledge sharing network to help spread information and knowledge on the links between climate change, human health, food security and water.

The EcoHealth Programme of the International Development Research Centre was another significant step towards increased efforts to understand the impacts of climate change on health in Botswana, Malawi, South Africa, Tanzania and Uganda.

Climate change is a significant and emerging threat to public health. There is need for capacity building and implementation of projects to strengthen the health system response to climate change and to ensure that health is appropriately considered in decisions made by other sectors such as energy and transport.

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See also

- *Documentation of Research on Climate Change and Human Health in Southern Africa*, by Opha Pauline Dube and Moses J. Chimbari. DBL – Centre for Health Research and Development, Faculty of Life Sciences, University of Copenhagen, Denmark, July 2009 (PDF) [http://bit.ly/bQ4fgU](http://bit.ly/bQ4fgU)
- **Southern Africa Climate Change Network (SACCNet)** [http://bit.ly/eYVTRg](http://bit.ly/eYVTRg)
Vector-borne diseases such as malaria are rising in Africa. Understanding how and why is essential for developing effective control measures. If African countries are to prevent the rise of malaria, they must improve the collection of national and regional data.

Mosquitoes are flourishing
Rising temperatures can extend the habitats of the mosquitoes that carry the malaria parasite. This is shifting the boundaries of malaria transmission, in terms of latitude and altitude. For example, many highland areas in Burundi, Kenya and Uganda that were historically classed as malaria-free now experience epidemics.

Droughts also increase malaria in sub-Saharan Africa. A three-year drought, combined with water extraction to generate power, has reduced water levels in Lake Victoria, Africa’s largest lake. The stagnant pools that have formed around the shoreline are prime breeding sites for mosquitoes. Also, floods and higher rainfall create new or larger mosquito breeding sites – this is happening in Mozambique.

Contributing factors
Social and economic factors, such as poverty and poor health services, aggravate these climate-related problems. For example, people who cannot afford to move away from flood-affected areas have an increased chance of malaria infection. This is particularly true for children, pregnant women and the elderly, who are already high-risk groups.

Quantifying the risks
Containing the spread of malaria in Africa requires strategies that consider the different climatic, social and economic factors in each region. These factors are rarely recorded, making it difficult to assess the actual local determinants of malaria.

Improved national and regional data will enable countries to monitor more accurately changes in local conditions – both social and climatic – that are likely to increase the risk of an outbreak. This data will enable policymakers to develop regional strategies to control the disease, and tailor treatment options to local malaria outbreaks.

These assessments should be based on detailed surveillance to identify all the local factors that could influence the risk of malaria transmission. Likely factors include:
- environmental changes such as deforestation, irrigation and swamp drainage
- population growth – when the number of people living in an area increases, a large number of them are exposed to the infection
- access to health care, resistance to anti-malarial drugs and the efficiency of vector control of mosquitoes using chemical insecticides; mosquitoes have been shown to develop resistance to these chemicals.

Regional responses
Making reliable assessments will require joint action. Countries where malaria is already a problem must coordinate efforts to identify and record accurate malaria transmission data. For example, Kenya, Tanzania and Uganda must work with each other and with southern Egypt and Sudan, where it is likely to spread. A regional board could help coordinate these national efforts.

- Countries must update malaria transmission data regularly – at least every six months – to identify changing patterns and enable each country to assess its own malaria situation and formulate a plan of action.
- Community groups and academic institutions can assist health personnel by supplying details of climatic and social variables, and helping to take field measurements.
- Countries must establish protective sites that represent different transmission patterns for each country – agencies including the Kenya Medical Research Institute and Tanzania’s Ifakara Health Research and Development Centre already work on this.
- Annual reporting to international bodies such as the World Health Organization would enable regional data analyses to be put into a broader context. This could help to develop and implement malaria-control strategies to cope with the influence of changing climatic conditions.

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See also
Reducing the adverse health effects of climate change, The Bulletin of the WHO, 9 September 2009

Predicting and mapping malaria under climate change scenarios: the potential redistribution of malaria vectors in Africa, Henri E. Z. Tonnang, Richard Y. M. Kangalawe, and Pius Z. Yanda, Malaria Journal v.9, 2010
East Africa is experiencing malaria outbreaks in highland areas where there is little experience with the disease. Research led by the Kenya Medical Research Institute (KEMRI) combines climate observations with medical research to predict outbreaks in Kenya, Tanzania and Uganda.

KEMRI researchers noticed how malaria outbreaks in Kenya’s highland districts occurred during El Niño episodes – a periodic disturbance that is associated with warming and heavy rains in East Africa. In collaboration with the Kenya Meteorological Department, they designed a model for early prediction of malaria epidemics and launched it in 2010.

The model uses a simple formula to detect abnormal temperatures and rainfall in the highlands that increase the risk of malaria epidemics. When the identified risk level reaches 50 percent, there is a high degree of certainty of an outbreak within three months. The model uses weather predictions, information about the mosquitoes’ population growth, and data on the drainage characteristics of particular areas.

Testing the model
The team used in-patient malaria data from hospitals in western Kenya’s Kakamega highlands. The findings were matched with data from nearby weather stations to check for links between prevailing climatic conditions and malaria cases. The results showed it was possible to develop site-specific skills in the use of the malaria prediction model and transfer it to end users in each participating country.

The model, was later widely tested and validated using nine years of data and was able to accurately predict malaria outbreaks in 10 sites during the 1997 El Niño rains, the 2003 long rains and the 2006 long rains. It has worked effectively in tests in Nyanza Province, Western Province and Rift Valley Province of Kenya, as well as in Tanzania and Uganda.

Challenges
Improved malaria prediction will be an essential part of Africa’s adaptation to climate change. The challenge is to develop and deploy an instrument that health system managers can use to reliably predict the onset of a malaria epidemic in areas not traditionally prone to the disease.

A current three-year project, being implemented by the KEMRI-led research team, explores how the model can provide local health systems with a greater base of certainty on which to plan prevention and treatment.

The project has trained district healthcare providers and policymakers across the three countries to use the prediction model to provide early warnings and intervene in an effective manner.

With more warning time, health officials can take preventive measures such as distributing mosquito nets, and draining or spraying mosquito breeding grounds. Spraying can be done at the right time to reduce the chance of mosquitoes developing resistance against insecticides. Health officials can also ensure they have adequate staff and medical supplies on standby to deal with increased malaria cases.

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The current three-year project is being implemented by a KEMRI-led research team that includes: Uganda’s Ministry of Health; Tanzania’s National Institute for Medical Research; the Intergovernmental Authority on Development’s Climate Prediction and Application Centre; the International Centre for Insect Physiology and Ecology; Community Health Support, Kenya; and the Walter Reed Army Institute for Research, USA.

Malaria moves upland
Temperatures in the East African highlands have risen by 0.5°C in the last 50 years. This has doubled the number of malaria-carrying mosquitoes. In Kenya’s highlands, the incidence of malaria increased 300 percent; in Tanzania by 146 percent; and in Uganda by 256 percent during the 1997-98 El Niño event.

Medical records in Ethiopia show a high correlation between malarial incidence and increases in rainfall and temperature. Warm conditions allow both the anopheles mosquito and the malarial parasite it carries to develop more quickly, while wet conditions increase mosquito life expectancy and provide breeding habitats.

See also
Adaptation is...Predicting Malaria’s Changing Course in Africa, Ochieng Rapuro, IDRC, 2007
Climate-related disasters have aggravated the vulnerability of people living in sub-Saharan Africa’s urban areas, particularly their health. The environmental, social and economic characteristics of city dwellers vary, and climatic events have varying consequences for different people’s health. Children are often especially affected.

Climate change is increasing the number of severe and frequent floods, including those affecting urban areas. This leads to increases in water-borne and water-washed diseases like diarrhoea, which occur when sewage mixes with drinking water or food.

A study of 120 nursing mothers who were victims of floods and rainstorm events in Ilorin, Nigeria, was conducted between 2000 and 2009. The data included the number and location of victims of flood events in Ilorin metropolis. The number of households affected by these events during the period under review was obtained from the Kwara State Office of the National Emergency Management Agency.

The results show that flood events had a broad range of health impacts:

- 61 percent of the mothers indicated bodily injuries caused by debris in the flood water among their household members.
- Domestic water sources were disrupted in 65.7 percent of the households.
- New cases of childhood diarrhoea occurred in 70.9 percent of the households sampled.

Adaptive methods

The study identified some community-based and household-level management practices that reduce the health impacts of extreme floods.

- Mothers, despite their low income, contributed to the purchase of packs of Oral Rehydration Therapy powders and bottled water, specifically for their children.
- Women’s social clubs were used as platforms to discuss solutions to the health impacts of floods; women shared ideas and knowledge about the prevention and treatment of diarrhoea and flood-related diseases.
- Nearly half (45.8 percent) of the mothers surveyed sent their children to stay with friends and relatives in safer locations within and outside the city until the flood subsided.

These findings show that mothers are able to create adaptation strategies during disasters; but adaptation strategies are dictated by income and the nature of disasters. Some solutions reduce the impacts of meteorological hazards while others are inherently risky and unsustainable. For example, 35 percent of the mothers changed from orthodox clinic-based healthcare to traditional alternative healing options, because of cost and access; traditional healing options are particularly risky for diarrhoeal or cholera diseases, which are characterised by rapid onset and high fatality rates within a short period.

Recommendations

- Institutional support by governments and non-governmental agencies must be designed for rapid responses to evacuate victims during disasters and for post-disaster adjustment in terms of reconstructing homes and business premises for affected urban populations, particularly women and children.
- Stakeholders involved in municipal housing and infrastructural provision, such as ministries of health, housing and the environment, should improve on housing quality and infrastructure, particularly in inner cities in sub-Saharan Africa, which are highly conducive to disease occurrence.
- Urban administrations must address the public health implications of these defects.
- Socio-cultural groups of women and men are platforms for strengthening adaptive practices that are considered sustainable such, as awareness campaigns on the health impacts of climate change, as observed among women in this study.

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See also

Multiple Vulnerabilities and Urban Health Challenges from Extreme Weather Events in Ilorin, Nigeria by U.A. Raheem 2010

Join the AfricaAdapt network

AfricaAdapt is an independent network in French and English, focused exclusively on Africa. The aim is to facilitate the flow of climate change adaptation knowledge for sustainable livelihoods between researchers, policymakers, civil society organisations, and communities who are vulnerable to climate variability and change across the continent.

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Communities in Ngamiland District, in the northwestern part of Botswana, rely heavily on water from the Okavango Delta river system. But the productivity of the Delta is threatened as the world warms up. Climate change is a particular threat to children’s well-being in the Okavango Delta.

Children under the age of five constitute approximately 12.5 percent of Botswana’s population. As temperatures soar and rains fail, these children are exposed to deadly climate-sensitive diseases and conditions, such as diarrhoea and malnutrition. These threaten child well-being differently from adults. Water scarcity threatens children particularly, as they need to consume more fluids per body weight than adults.

Researchers in the Botswana Eco-health Project (BEP) conducted a study on a distinct sub-population of flood recession (molapo) farmers in and at the fringes of the Okavango River. Molapo farming is done along floodplains of the river channels as floods recede. The BEP covered three traditional molapo farming villages: Tubu (which experiences frequent flooding), Shorobe (periodic flooding) and Xobe (occasional flooding).

Findings
The research findings from participatory rural appraisal workshops show that Tubu residents had the most disastrous floods. In Xobe and Shorobe, residents experienced prolonged dry spells in their river channels and both sites had irregular floods. Positive floods resulted in bountiful harvests and the cultivation of vegetable gardens (especially in Xobe). Dry spells and high temperatures caused water shortage for human and animal consumption. High floods in Tubu and Shorobe contributed to spread of vector borne diseases among children such as malaria.

Community members in Xobe stated that there were diarrhoea outbreaks in 1996 and 2009, when high temperatures resulted in the river drying up completely, increasing the risk of water contamination from decomposing carcasses.

Contaminated water increases the risk of diarrhoeal outbreaks among children. Warmer climate causes heatwaves that put children at risk because of their need for more water per kilo of body weight than adults.

Communities associated the drying up of the river with shortage of food and child abandonment, as single mothers migrated to peri-urban Maun in search of employment or better means of livelihood. Climate change affects agricultural production, thus threatening the regular supply of nutritious food to children. Changes may also result in increased use of pesticides, posing further exposure risks for children. However, in these communities when food is in short supply, children are prioritised in the consumption of the limited resources. Xobe participants said that there is little or no malnutrition in children between the ages of two months and five years. This is partly because wild food plants are eaten extensively in the village. Wild foods given to children include mokutshumo (Diospyros mespiliformis) – crushed and mixed with milk; motsaudi (Garcinia Livingstonei), pounded and mixed with milk; and xoma (Nymphaea lotus seeds), crushed and prepared as soft porridge. Vegetable gardens in Xobe have also mostly benefited children. For Xobe residents, a malnourished child is a sign of parental neglect.

Conclusion
The frequency and severity of floods and dry spells are expected to increase in some parts of the Delta. Development interventions such as the BEP’s work on molapo farming communities in the Okavango Delta need to prioritise the identification of measures to mitigate against the impacts of climate change risks on children under five years old.

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Many parasite zoonoses – infectious diseases transmitted from wild or domestic animals to humans – are potentially highly vulnerable to changes in the climate. Their life-cycle stages and their host organisms are both directly affected by climatic conditions, and many diseases of this nature are predicted to spread in Africa.

Some zoonotic diseases are transmitted by ‘agents’, for example ticks and biting insects such as tsetse flies and mosquitoes. These agents are carried by domestic pets, livestock animals and wild animals. Contaminated drinking water also transmits zoonotic pathogens to humans and animals.

Approximately 75 percent of recent emerging infectious diseases are zoonotic. They are medically diverse and share common features that allow them to persist in resource-poor communities, where livestock farming is the main livelihood. Some zoonotic diseases have severe impacts on people, especially those with an immune system weakened by age or illness.

Rift Valley Fever (a viral disease transmitted by mosquitoes), African trypanosomiasis (transmitted by tsetse flies), brucellosis (caused by ingesting unsterilised milk or meat from infected animals), snail-borne fascioliasis, and the water-borne parasitic diseases like cryptosporidiosis and giardiasis are all predicted to significantly increase in eastern and southern Africa.

Climate change and zoonoses
There is a proven relationship between climate change and the increased prevalence of several zoonotic diseases. This is more pronounced in zoonoses where arthropod intermediate hosts or freshwater snails are involved in the transmission. Climate change can shift the boundaries for ecosystem components like average temperature and precipitation ranges, and influence processes integral to parasite transmission and persistence in the environment.

Many previously dry areas in eastern and southern Africa have become prone to floods due to climate change. When they are inundated with water, the chances of disease spread and transmission increase. The survival and multiplication of intermediate hosts also increases. Fascioliasis, Rift Valley Fever, cryptosporidiosis and giardiasis are all heavily influenced by changes in rainfall patterns, which affect river flows, lake levels, and water levels in coastal and delta regions.

Warmer temperatures also directly increase the reproduction of mosquitoes and ticks and their ability to transmit zoonotic pathogens, despite shortening their mean daily survival rates.

Possible responses
- Remote sensing and geographical information systems can enhance our understanding of the relationship between the climate and vector-borne or water-borne zoonoses. These tools can collect information to create early warning and forecasting systems for zoonotic disease trends.
- Countries at risk must implement early-control measures, including vaccinations for those diseases where a vaccine is available.
- They should also initiate vector-control programmes (methods that limit or eradicate the animals that transmit disease pathogens) and, if possible, relocate vulnerable communities away from at-risk areas.

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Indigenous responses to zoonoses
There are several reports of indigenous plants being used by rural farmers to treat cysticercosis in pigs, and in humans. In South Africa’s Eastern Cape, a study interviewed 224 pig farmers about how they manage porcine cysticercosis: 15 percent indicated that they use indigenous plants and traditional remedies. In Tanzania, the Masai people mash lodwa (Embelia schimaperi) seeds and drink it in tea and milk; the Turkana people in northern Kenya and the people of southern Sudan use an indigenous herb (Echinococcus spp) to treat the disease.

See also
ILRI Clippings on Zoonotic Diseases


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Future issues will focus on: pastoralism; gender; and energy. Please tell us what you think about this fifth issue of Joto Afrika and what you would like to read in future issues – contact details are on page 8.
Letters to the editor

We welcome your feedback on this fifth issue of Joto Afrika. Please send us your thoughts using the contact details on page 8. A selection of letters will be printed in the next issue. Letters may be edited.

Dear Editor,

I would like to take this opportunity to express my gratitude for receiving the Joto Afrika newsletter you sent me. I was happy to read it as it explains the difficulties which farmers are facing concerning climate change in most African countries.

As a medical worker, I really regret the changing of the climate because without good crop harvests, there will be no sustainable health for families, communities and society in general.

I will be happy if you continue to post this newsletter to me. In my area, there are so many people interested in Joto Afrika.

John N. Waitara
Magereza Malya, P.O. Box 2, Malya, Mwanza, Tanzania

Dear Editor,

We are requesting old used books, magazines, leaflets, brochures, publications and back issues of your educational and informative Joto Afrika magazine. We have just opened a rural small village library, with only 45 books and 10 magazines – and three of these magazines are Joto Afrika! We ask that if you have any publications that you no longer use, could you please send them to us for our small library for rural village communities.

We really appreciate receiving Joto Afrika. It really covers all the topics on climate change. We have come to know more about climate change. It’s even better than being at a workshop or university studying for climate change.

We thank you so much. Keep it up and continue sending them to us.

Samson Swedy Nyendwa
Mwafumba Multipurpose Cooperative Society, P.O. Box 11, Chibombo, Zambia

Dear Editor,

I highly appreciate the valuable information you give us in your journals. It would be great if you addressed some issues that I feel need to be looked at in greater detail. These include:

- gender and gender equality
- how to prevent and manage HIV infections
- what can be done to prevent Marasmus and Kwashiorkor.

T.R Chawinga
Rumphi, Northern Region, Malawi

Editor: John, thanks for the feedback, we are glad to know that many people are interested in reading Joto Afrika. Please tell them to subscribe so that they can receive their own copies. Contacts for subscription can be found on pg 6. Don’t forget that Joto Afrika is also available online at: www.alin.net

Editor: Samson, we are glad to learn that you highly appreciate our newsletter and appreciate the great work in information sharing. We also ask members of the JA network to send Samson other publications for their small library.

Editor: Chawinga, this issue on health addresses some of your concerns. You will also be pleased to learn that Joto Afrika 6 focuses on gender issues; it will be out in early 2011 and we will respond to your question in the articles.

Contribute to Joto Afrika

Do you want to tell people how your community is adapting to climate change? Are you involved in a programme, project or research that is helping people to find practical solutions to cope with the effects of climate change? We want your contributions for Joto Afrika!

We are looking for research work, community case studies, videos, audio clips and photo essays about climate change adaptation across sub-Saharan Africa. The case studies need to be short (no more than 600 words), easy to understand and provide practical information for other people facing these problems. We welcome contributions in French and English.

If you would like to contribute, please contact the editor at jotoafrica@alin.net
Swapping animals for vegetables
Sarah Ayeri, a research scientist at the Kenya-based Centre for Training and Integrated Research in Arid and Semi Arid Lands Development, believes arable farming could help struggling pastoralists cope with the impacts of drought. Ayeri urges scientists and policymakers to explore economic, social and ecological mechanisms that will enable local communities to adapt to climate change.

In the past ten years alone, Turkana has experienced two droughts that decimated livestock herds and health. The chairperson of the Ngiturkana group says Turkana’s worsening climatic conditions will not deter her HIV-positive colleagues from growing vegetables. “We have no choice. With or without rains, farming must go on,” Naole says. “We desperately need the nutritional value from these foods.”

A group of people living with HIV/AIDS in north-west Kenya are defying the region’s tough climatic conditions to farm nutritious food crops. These crops help them to stay healthy.

Turkana District receives little rain, and arable farming has never been a priority in this part of Kenya. Most inhabitants keep livestock, moving from one area to another in search of pasture. But the Ngiturkana self-help group, which is made up of 89 HIV-positive men and women, has adopted a different approach. They grow vegetables against the odds; this is a semi-arid region beset by increasingly frequent droughts.

“We settled for farming for two major reasons. One, being HIV-positive means we are weaker, thus we cannot afford the nomadic lifestyle which involves trekking for several kilometres in a day,” explains Agnes Naole, the group’s chairperson. “Two, we desperately need the nutrients if we are to live longer.”

The group was started four years ago by five people living with HIV/AIDS in Lodwar township, who set it up as a support network. Hospital statistics show that the Turkana region has an HIV prevalence rate of around seven percent. Taking the drugs on an empty stomach can produce severe side effects like corrosion of the stomach, which often discourages patients from continuing their treatment. Meanwhile, studies show that proper nutrition enhances the effectiveness of antiretroviral therapy, prolonging the lives of people with HIV/AIDS.

The Ngiturkana group began by growing vegetables on individual plots. Most fresh vegetables and fruit sold in the area are transported from Kitale town, over 500km away, making them unaffordable for many people. The farmers were able to expand their efforts three years ago when Practical Action, a development charity that specialises in technology, bought them five hectares of land near the Turkwel River.

The Ngiturkana group cultivates amaranth, cowpeas, pumpkins, drought-resistant beans, sweet potatoes, cassava, tomatoes and any other food crop that can withstand the region’s challenging climate. One member says his count of CD4 cells – which are responsible for fighting off disease but are destroyed by the HIV virus – has increased from 250 to 925 in the past two years, thanks to better nutrition.

HIV-positive farmers reap health benefits in Kenya’s arid north

Case study

Members of Ngiturkana working on their land in Kenya. © Isaiah Esipisu, 2010