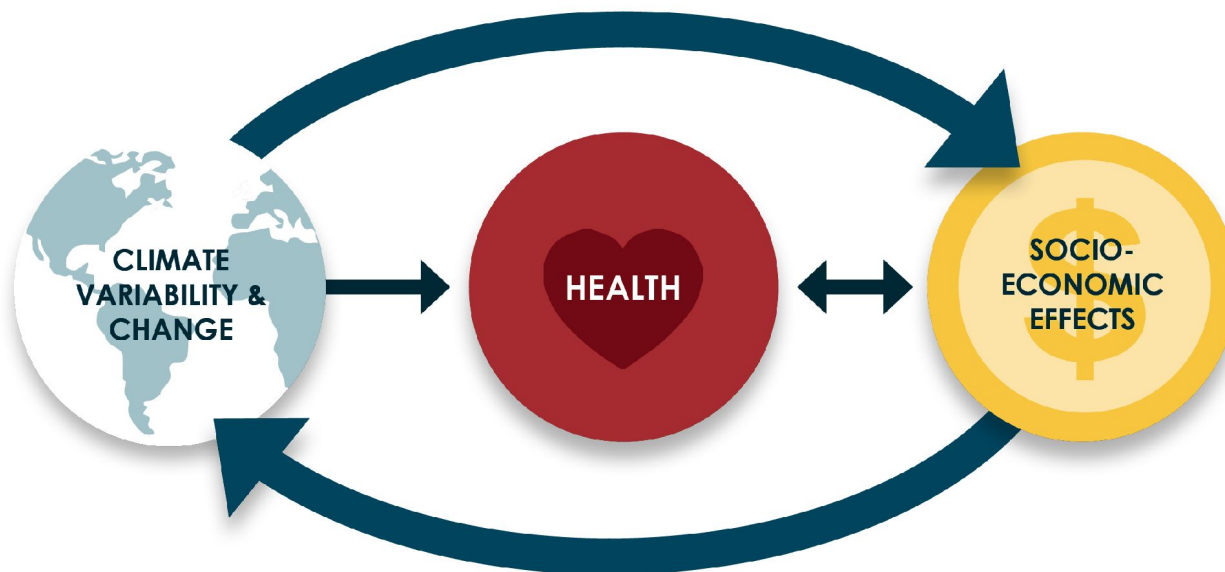
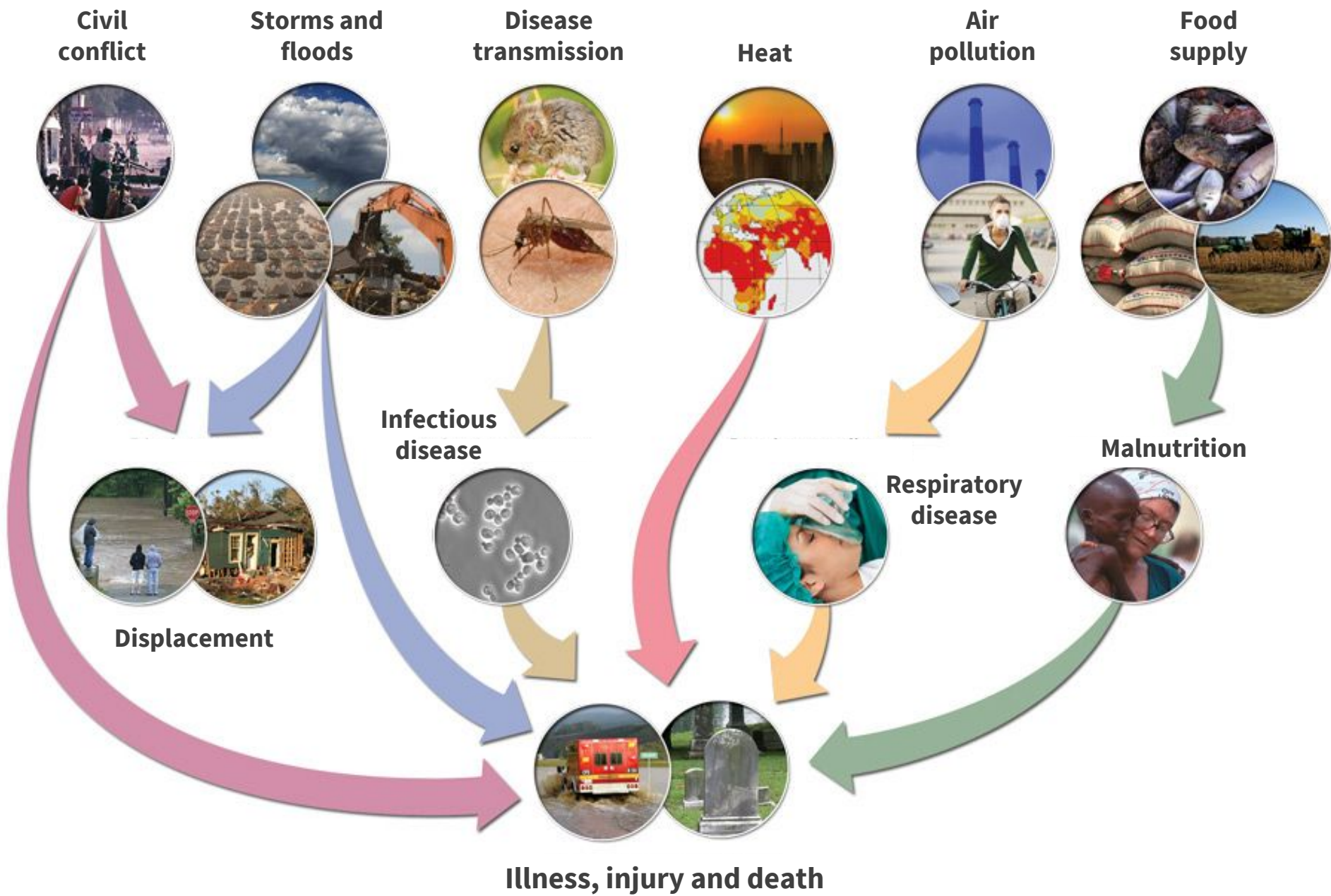




# Climate impacts on health through direct and indirect pathways

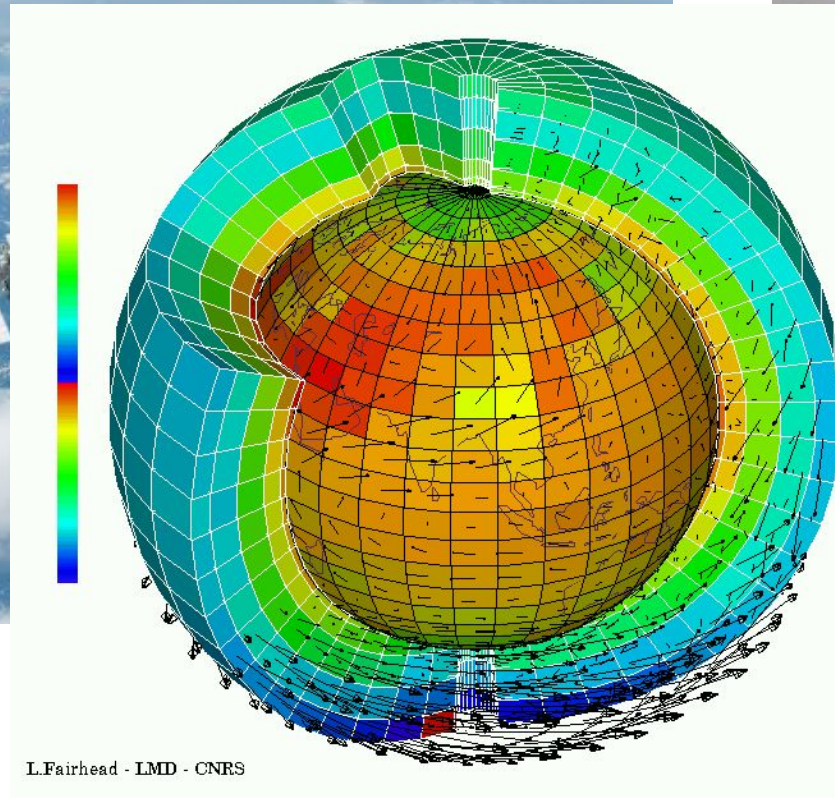
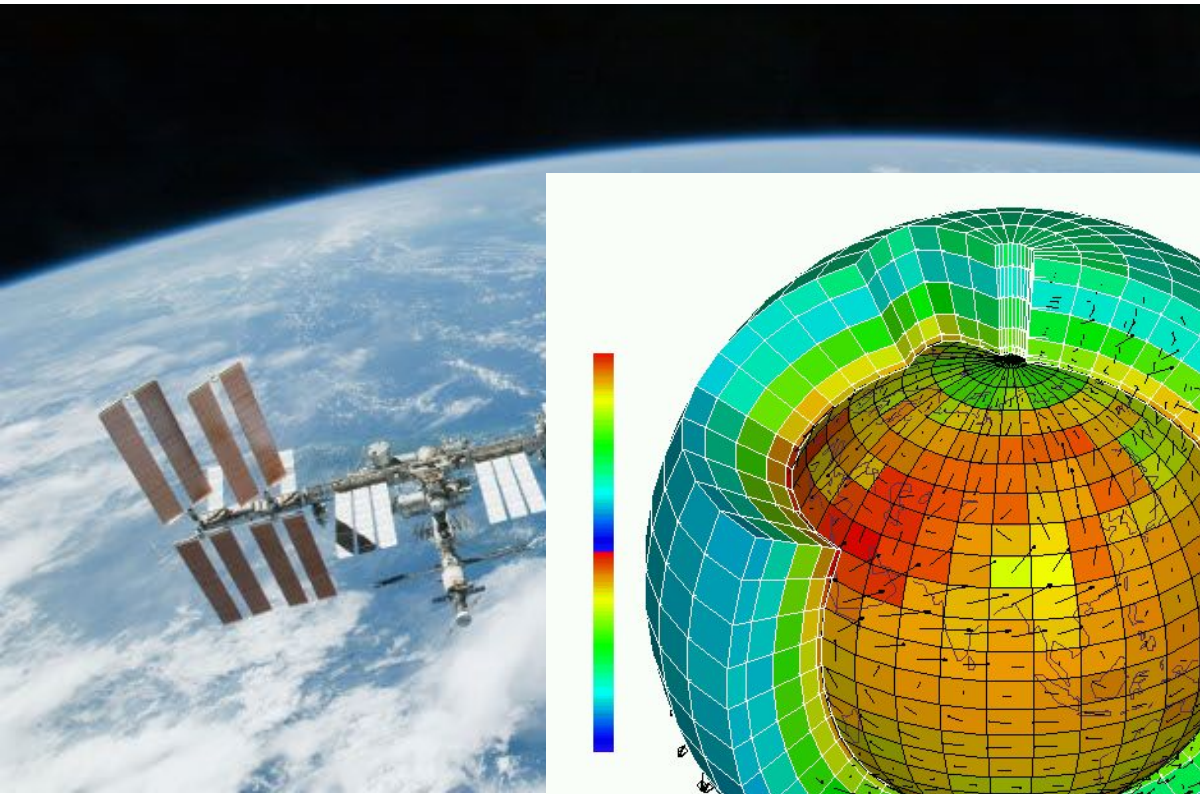




*Adapted from Borowski 2008*



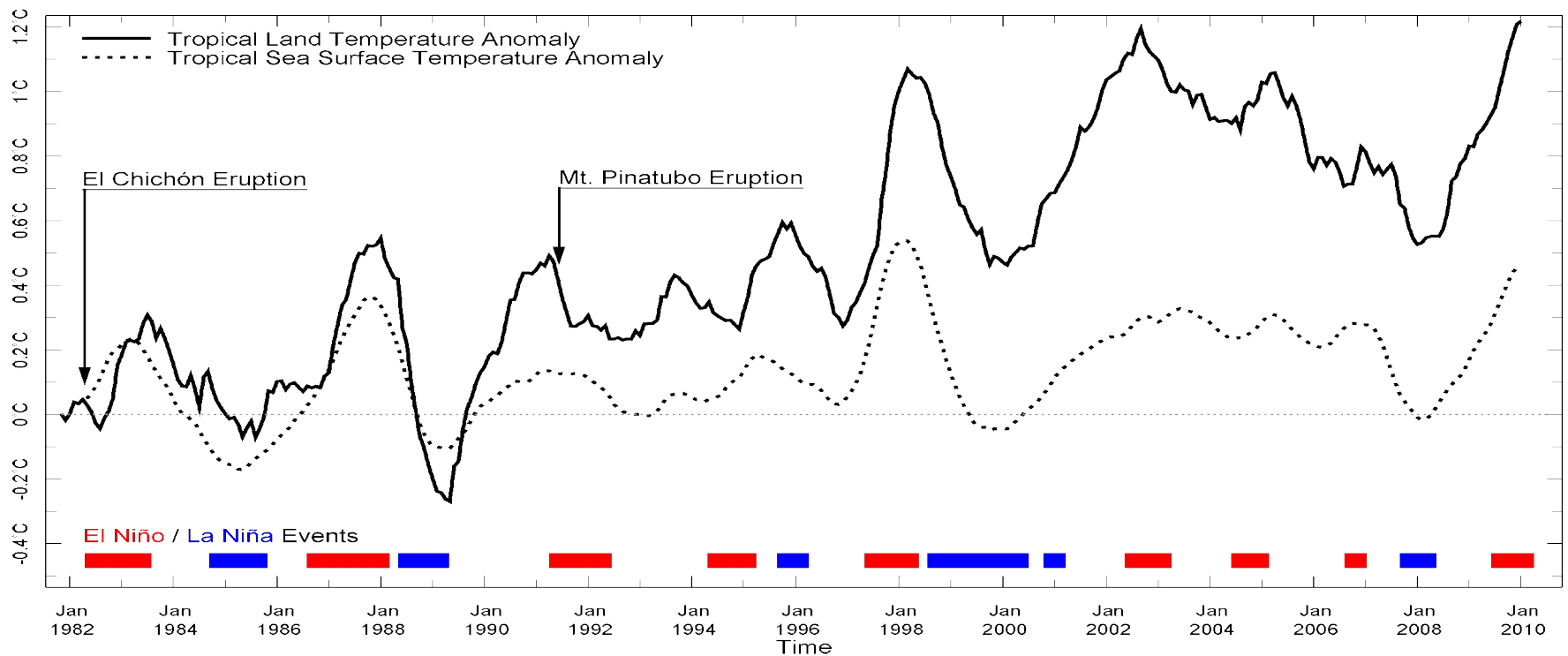
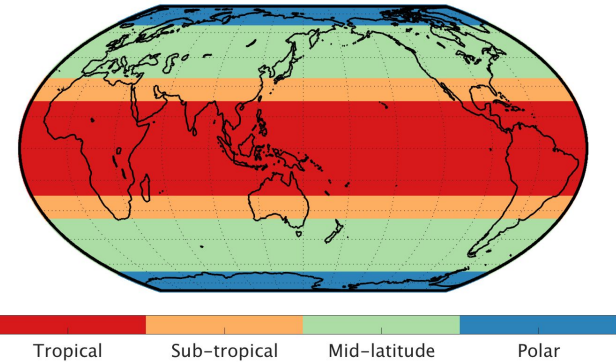
# Advances in climate and weather over recent decades



# Why is climate a unique data source for the health sector?

- climatology
- seasonality
- day-night rhythm
- potential predictability at multiple time scales (weather, seasonal, decadal and climate change)
- measured routinely by others, outside of the health sector

# Scale matters: global scale

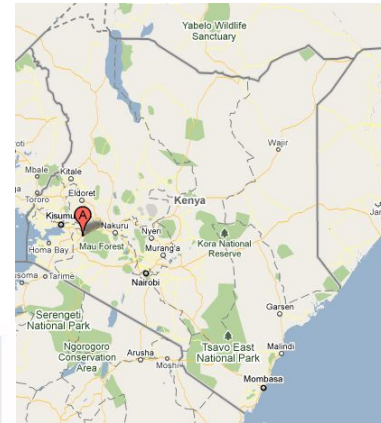
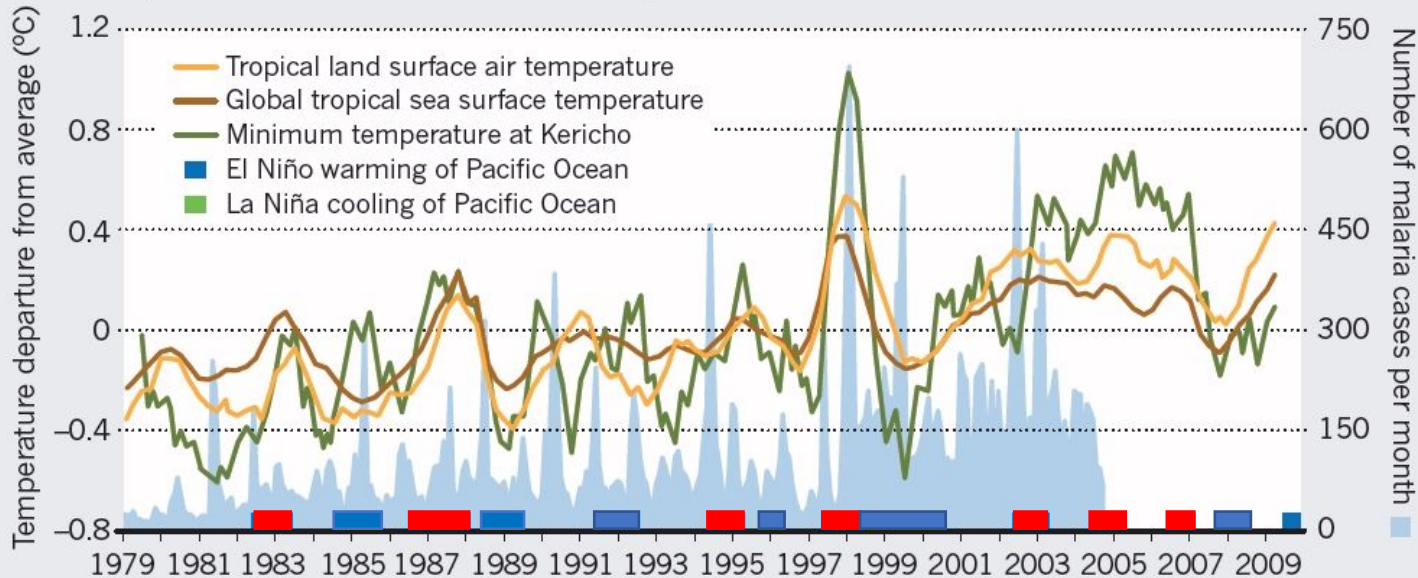




# Global meets local

## GOING UP

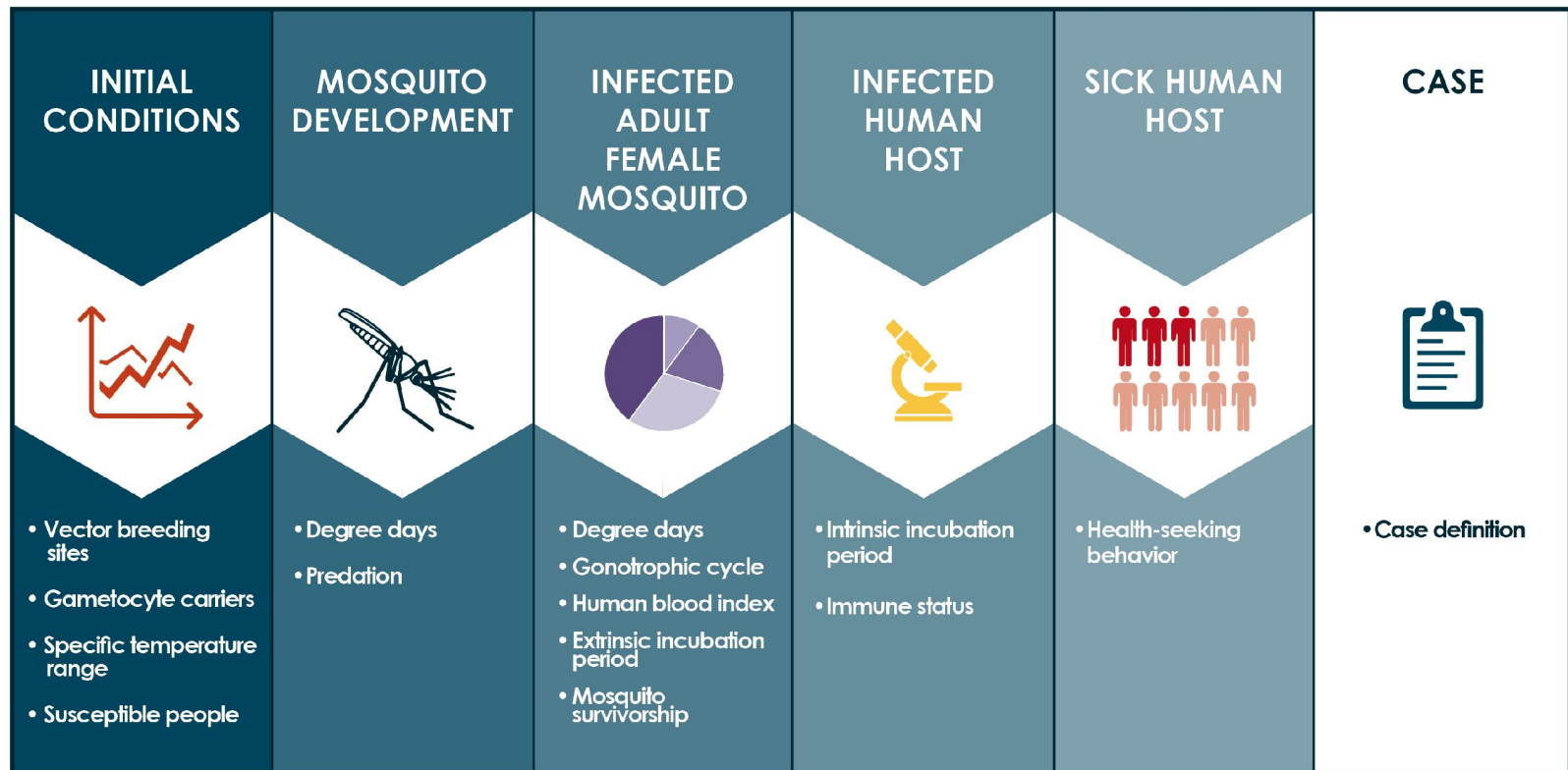
Malaria incidence and temperatures have risen near Kericho in Kenya over the past 30 years; health experts are keen to know whether they are linked.



Thomson, et al., (2011) Africa needs climate data to fight disease. *Nature*, 471 440-442

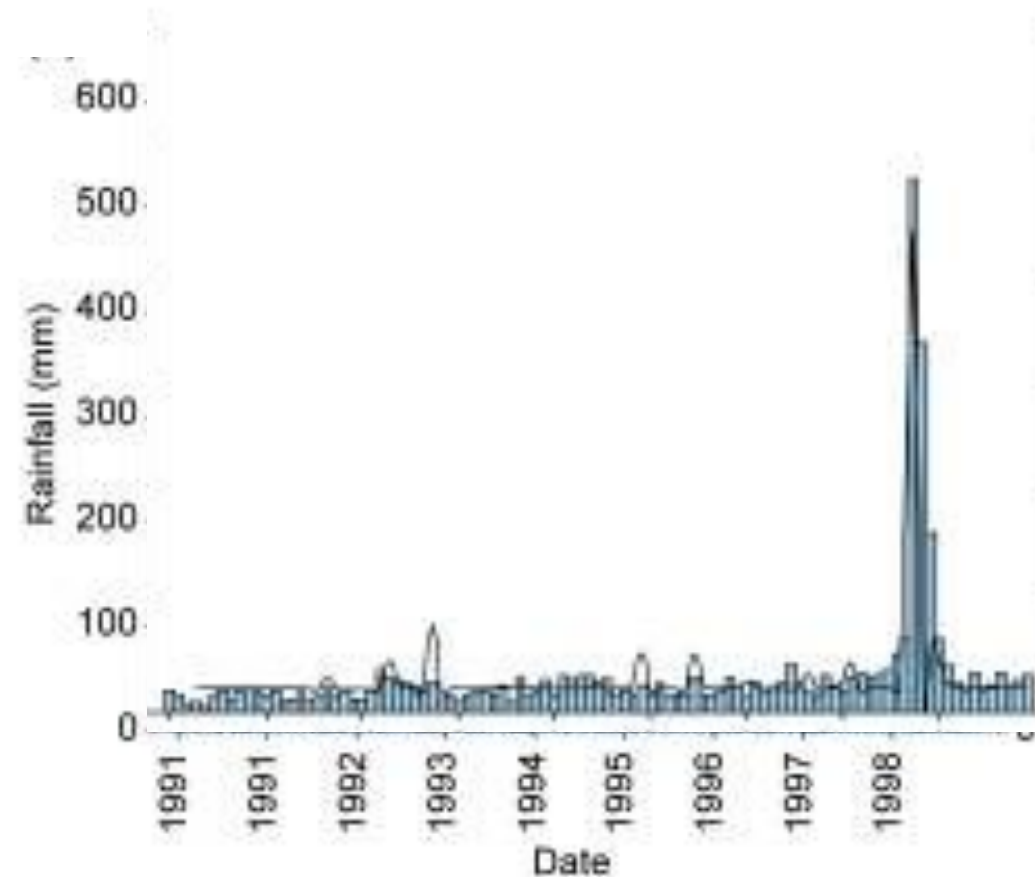
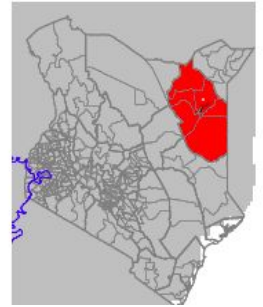
# Lags matter:

## Lags between climate indicators and health outcomes provide the basis for early warning





# Catastrophic death-rates in North Eastern Kenya following malaria epidemic associated with 1997/8 El Niño

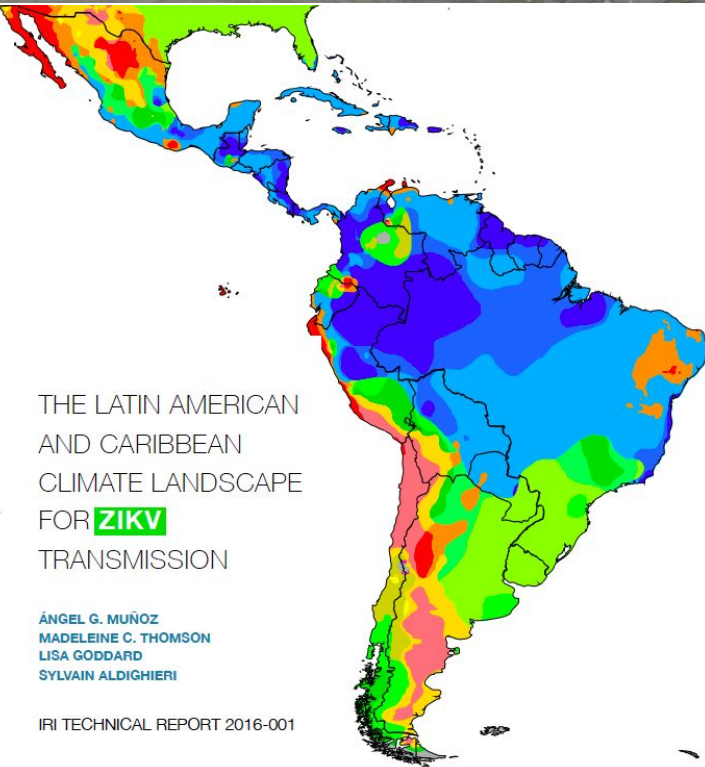


Catastrophic deaths, approximately 5% of the population, during the 1997–1998 epidemic



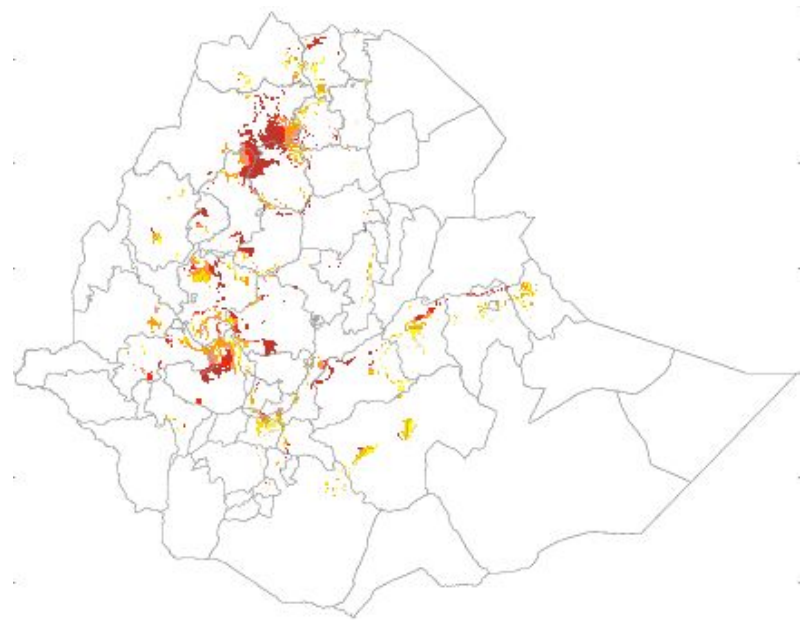


[Daria Devyatkina](#)



# Climate information and health decision-time-frames



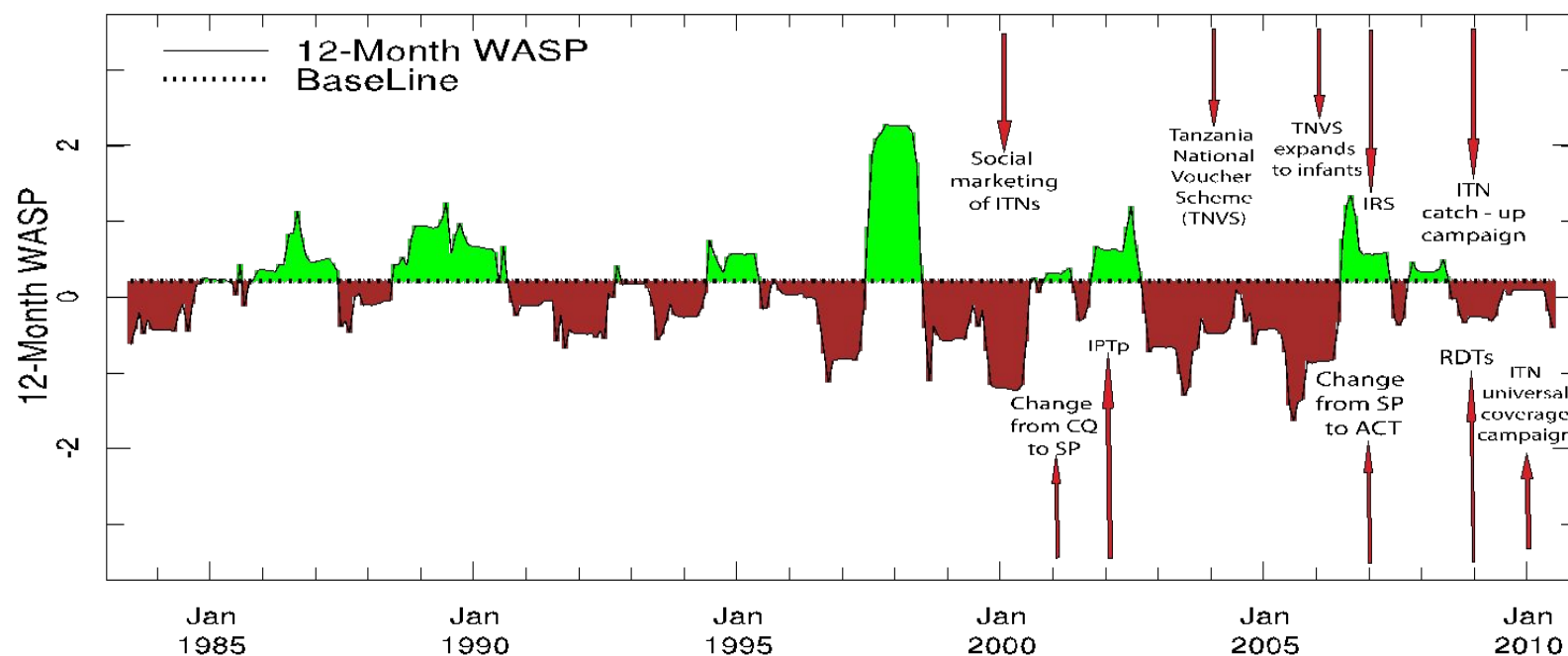


6 million **more** people exposed to malaria

Changing malaria risks as  
temperatures rise

Lyon et al., 2017. Temperature Suitability for Malaria Climbing the Ethiopian Highlands. Environmental Research Letters 12: 064015.

# Getting the climate right for malaria impact assessments



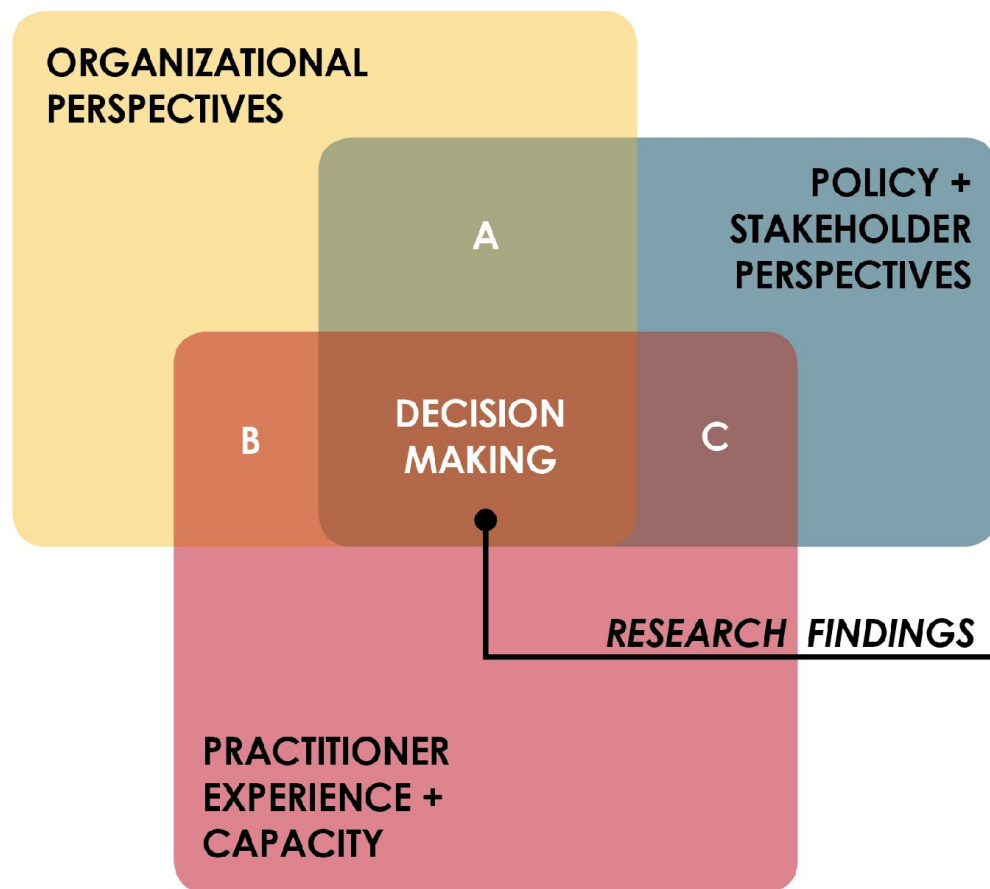
Thomson et al., 2017. Using rainfall and temperature data in the evaluation of national malaria control programs in Africa. *Am J Trop Med Hyg* 10.4269/ajtmh.16-0696: 32–45.

# How can climate information improve climate sensitive health outcomes?

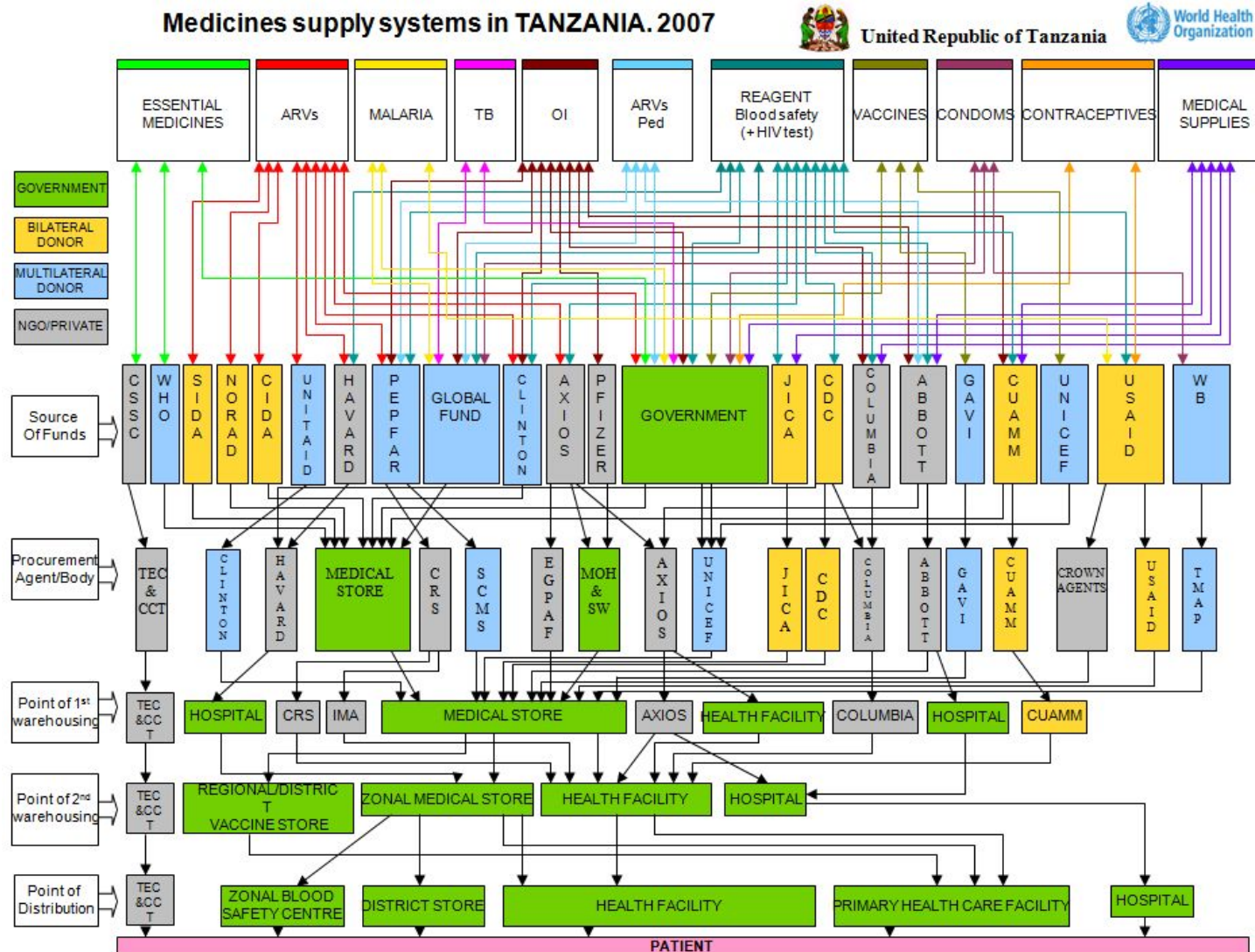
- improve our understanding of the **mechanisms** connecting climate variables to health outcomes
- estimate populations at risk (**risk mapping**)
- estimate **seasonality** of disease and timing of interventions
- monitor and predict **year-to-year** variations in incidence (including early warning systems)
- monitor and predict **longer term trends** (climate change assessments)
- improve assessment of the **impact of interventions** (by removing climate impact) estimate populations at risk (**risk mapping**)



# Getting climate and health research into operational decision-making



# Organizational Perspective





# Policy and stakeholder perspectives

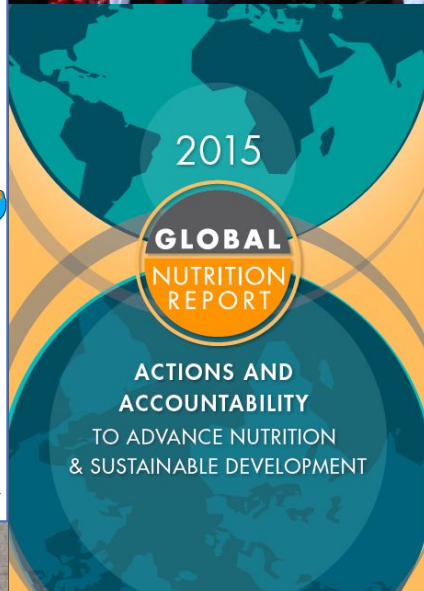
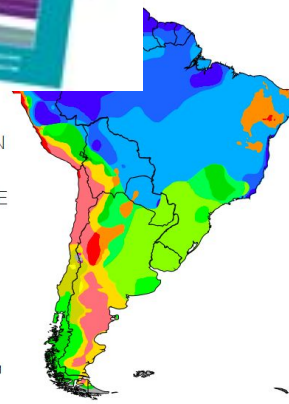
The collage features several key elements:

- Top Center:** A large, modern building with a prominent glass facade and a flat roof, likely a government or institutional building.
- Top Left:** A group of people, including men and women, standing in front of the building, possibly at a conference or meeting.
- Top Right:** A map of Africa with a red border, showing the continent's outline and internal borders.
- Middle Left:** A map of South America, specifically focusing on Brazil, with a red border and a grid overlay.
- Middle Right:** A map of the world, showing the continents and oceans, with a red border.
- Bottom Left:** A document titled "AMCOMET African Ministerial Conference" with a blue header and a photograph of people in a meeting.
- Bottom Center:** A document titled "2015 GLOBAL NUTRITION REPORT" with a blue header and a photograph of a group of people.
- Bottom Right:** A document titled "POLICY BRIEF The 2016-17 La Niña - Implications for Malaria in Ethiopia" with a blue header and a photograph of a group of people.

The text "Policy and stakeholder perspectives" is written in red at the top of the collage.



IRI TECHNICAL REPORT 2016-001



4-5 August 2014, Dar es Salaam, Tanzania



## La Niña Declared

Niño, La Niña conditions were formally  
by NOAA in November  
Niña has

...ings lower than normal rainfall in East Africa's October-November-December short rainy season (OND). The October forecast from the IRI for the November-January season 2.3 indicates increased rainfall.

normal rainfall in areas of eastern Africa that normally experience the short rainy season during the last quarter of the year (Figure 1). Rainfall deficits have driven the

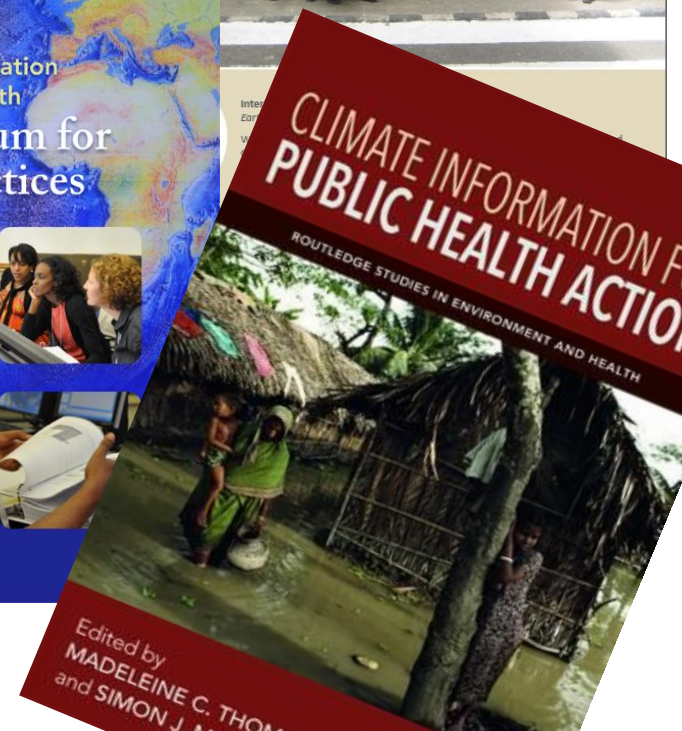
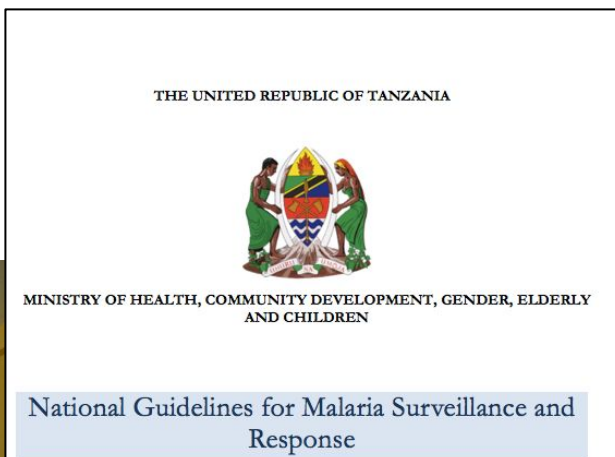
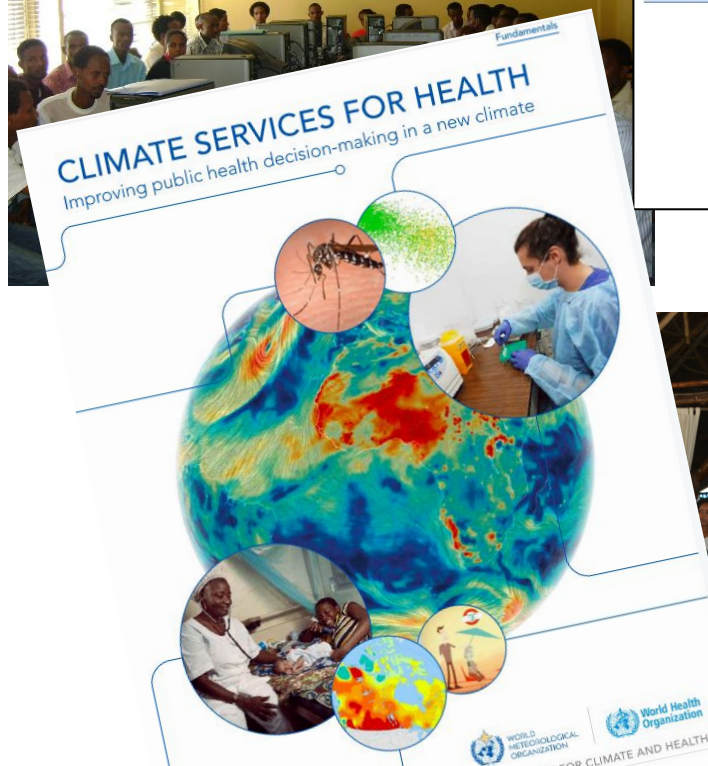
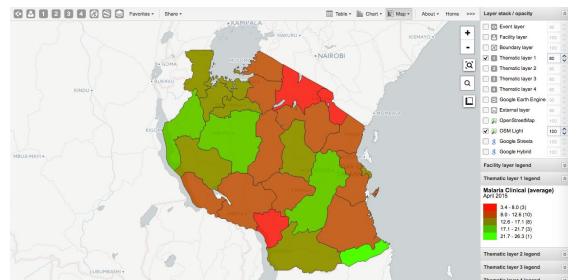
A recent systematic search of peer reviewed publications and unpublished reports of malaria in Ethiopia for the period 1953-2010

historical impact of La Niña on the season and region. While the impact tends to be dry, the impact is highly significant and varies by season and region. While the impact tends to be dry, the impact is highly significant and varies by season and region.

Figure 2. dragee created from the following July.



# Practitioner experiences and capacity



# Links

Book – including FREE EBOOK - Climate information for public health action

<https://www.routledge.com/Climate-Information-for-Public-Health-Action/Thomson-Mason/p/book/9781138069640>

Supplementary materials

[https://cipha.iri.columbia.edu/CIPHABOOK2019/Supplementary\\_Materials/](https://cipha.iri.columbia.edu/CIPHABOOK2019/Supplementary_Materials/)

Additional publications [https://www.researchgate.net/profile/Madeleine\\_Thomson](https://www.researchgate.net/profile/Madeleine_Thomson)

WHO/WMO Case Studies Report

<https://public.wmo.int/en/resources/library/climate-services-health-case-studies>

ENACTS sites

<https://iri.Columbia.edu/ENACTS>

Consortium of Climate Change and Health Education

<https://www.mailman.columbia.edu/research/global-consortium-climate-and-health-education>

When connecting climate to health outcomes – data quality matters (a lot)

