

Dynamic  
Drivers of  
Disease  
in Africa



# Comparing the risk of mosquito-borne infections in humans in irrigated and non-irrigated sites in Kenya

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# Introduction

- More and more range lands in Africa are being converted to crop lands through irrigation to alleviate food insecurity
- These land use changes are mostly associated with:
  - Increasing human population – traditional sources of food no longer adequate
  - Climate change – decline in land productivity, reduction in rain-fed agriculture

# Introduction

- Results: major trade-offs in ecosystem services
  - More food produced (provisioning services) at the expense of biodiversity and regulatory services (disease, flooding, erosion)
  - More effects of climate change – due to deforestation, use of fertilizers – hence, shift in vegetation communities, biome and biodiversity

# Introduction

- This study:
  - investigates whether the development of irrigation schemes in an arid and semi-arid area in Kenya increases the risk of mosquito-borne infections [Rift Valley fever, West Nile virus, Dengue fever]



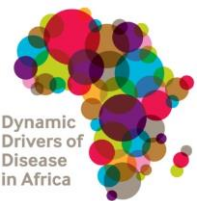
*Study site with stagnant water in irrigation canals – source of water for the locals but also breeding grounds for mosquitoes*

# Introduction

- Hypotheses
  - The creation of permanent water masses through irrigation alters vector biodiversity and abundance, populations of livestock and humans at risk and the nature and frequency interactions between hosts and vectors
  - The occurrence of relatively intensive systems has impacts on health, wellbeing and economy that differ quantitatively and qualitatively from impacts in minimally altered ecosystems.



*Pastoralists in the study site*



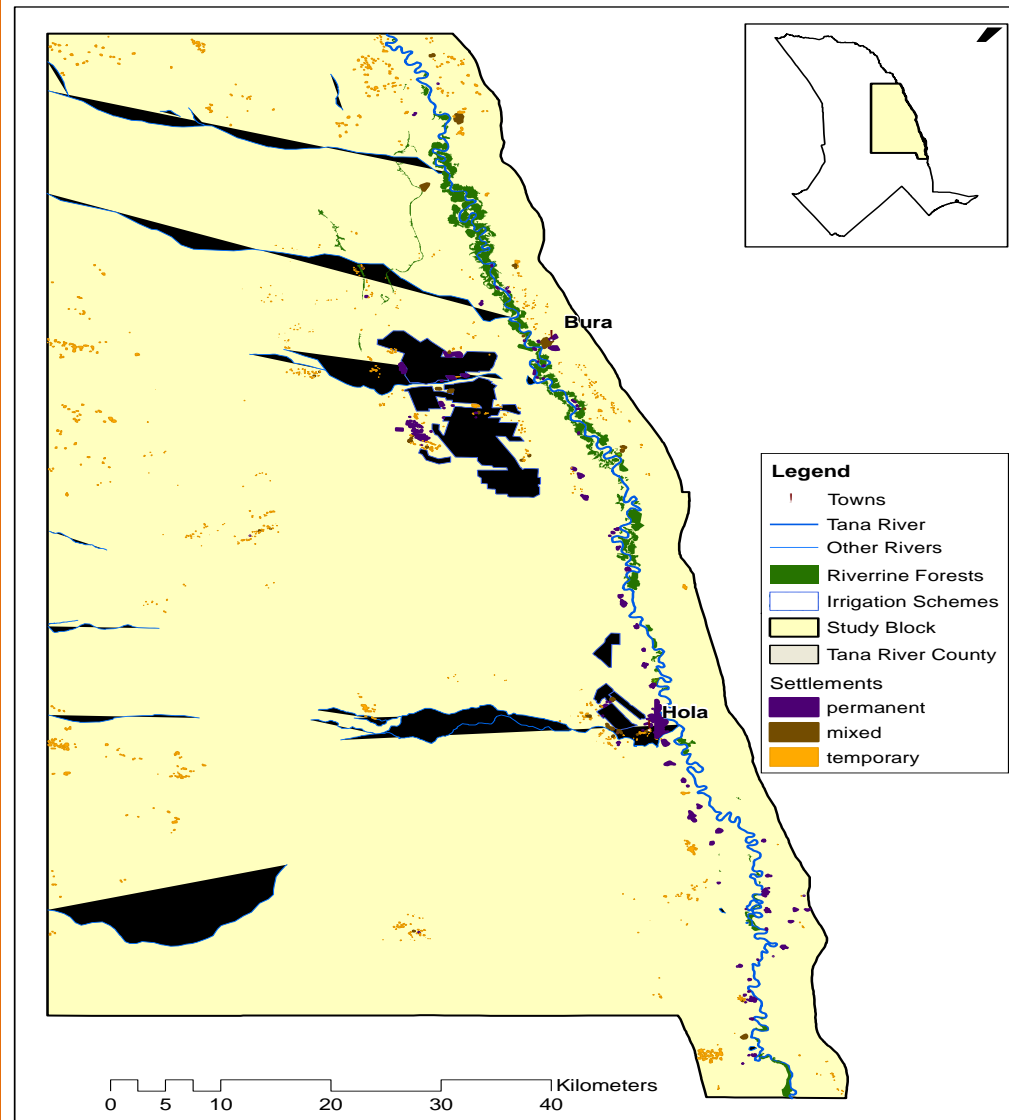
# Methodology

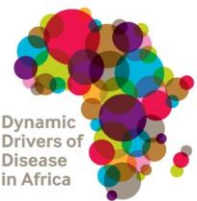
## The study site:

Tana River and Garissa counties, northeastern Kenya

## Study design

- Cross sectional surveys
- Power sample size estimation techniques – this suggested that we needed 220 households and 550 subjects





# Methodology

## Data collection

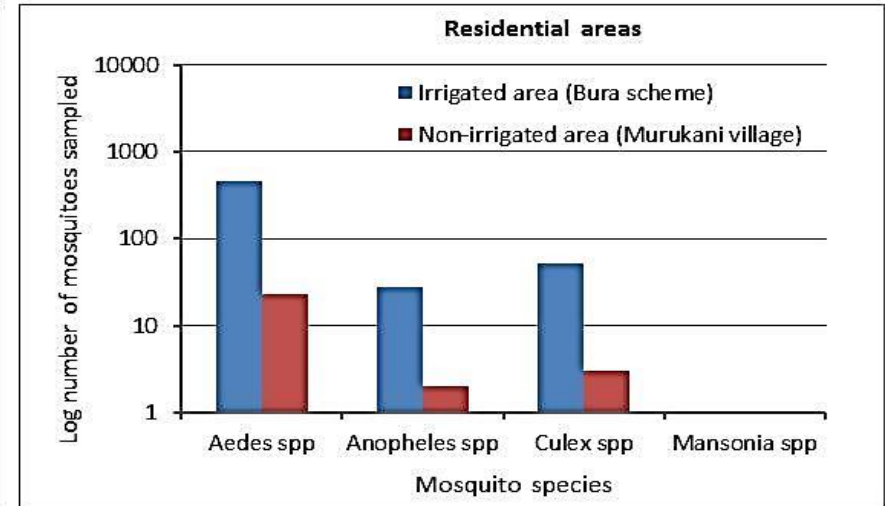
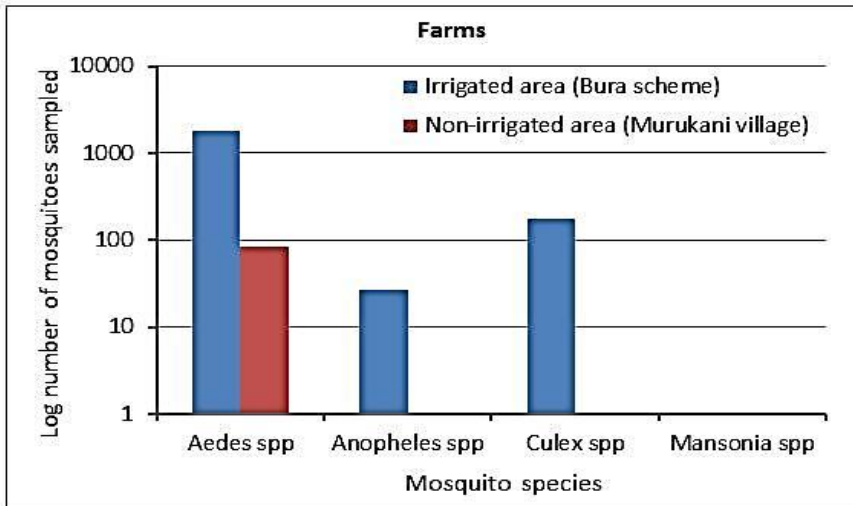
- Collation of secondary data from the local health centres
- Entomological surveys conducted using CDC miniature light traps
- Blood sampling – people above 5 years of age
- Laboratory screening of sera using ELISA
- Ethical approvals – African Medical Research Foundation (AMREF)



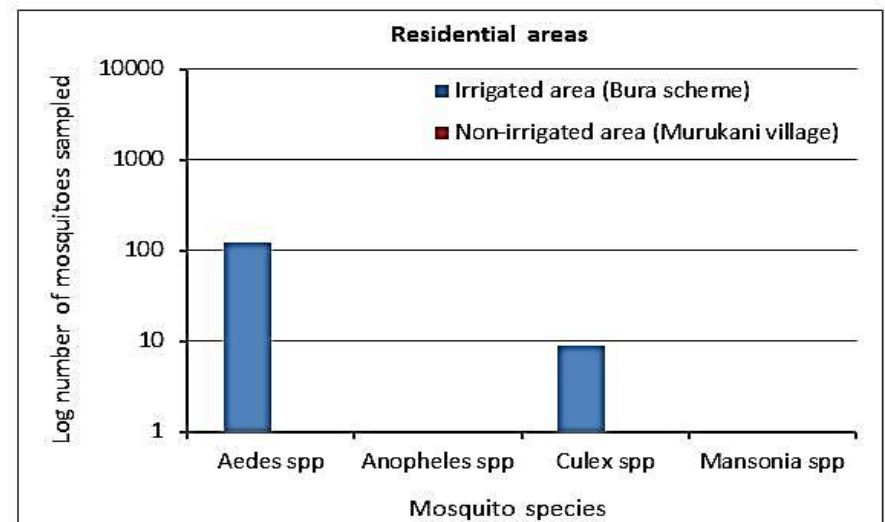
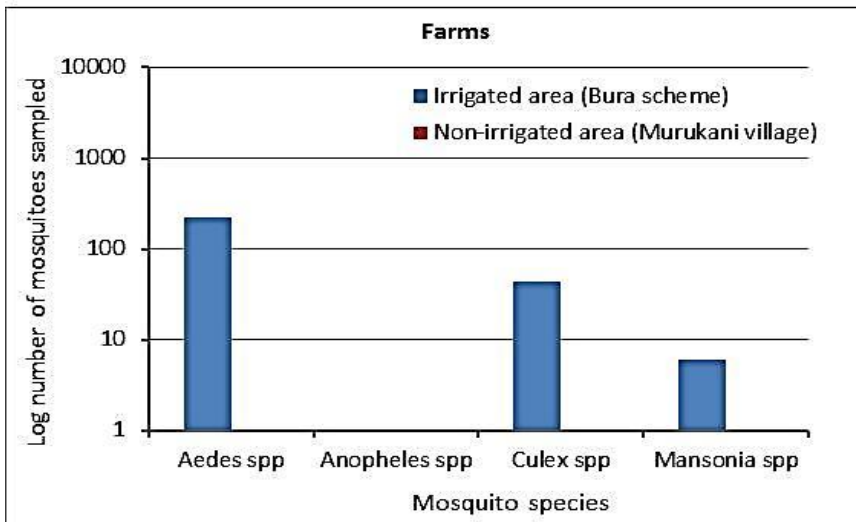
# Results

## Mosquitoes trapped – relative abundance and species distribution

(a) Results from surveys done when irrigation was active



(b) Results from surveys done at the inactive phase of irrigation





# Results

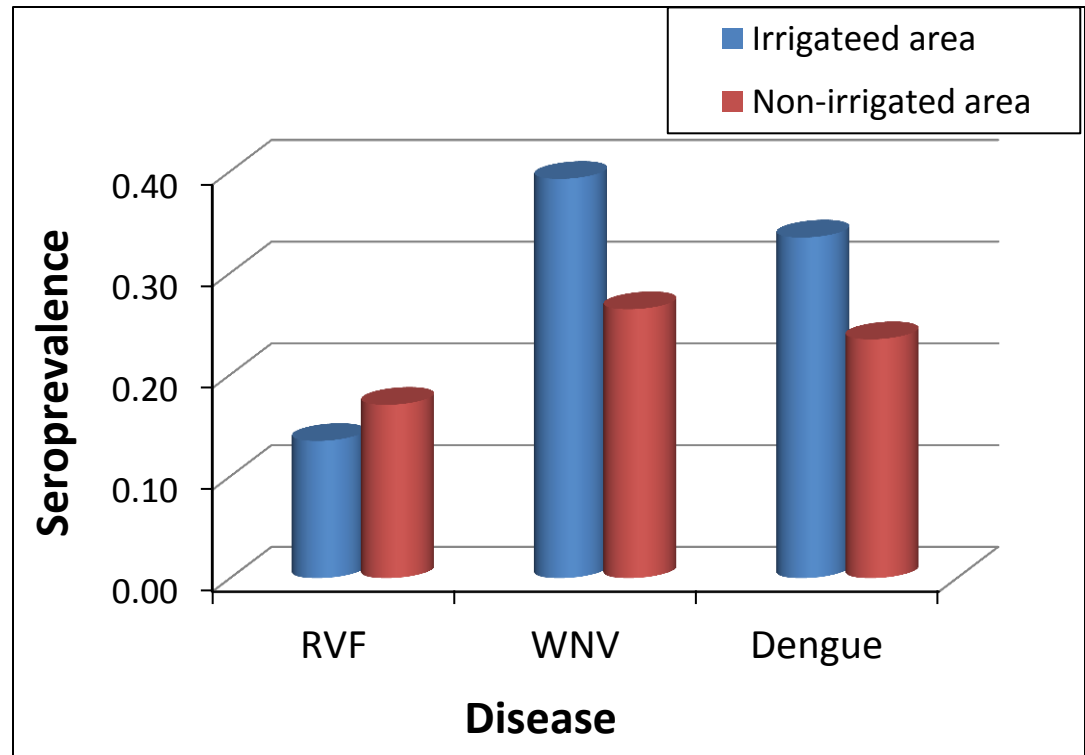
## Samples screened

- 481 samples have been screened so far
- Questionnaires administered to 430 households

## Serological tests

- WNV and Dengue seroprevalence apparently higher than that for RVF though confirmatory are yet to be done

## *Relative seroprevalence of RVF, WNV and Dengue*



# Risk factor analysis

Model – 2 Logistic regression models

Outcomes

- RVF
- Combined WNV and Dengue outcomes

Predictors

- Subject-level variables
- Household-level variables
- Area/village-level variables

# Risk factor analysis - findings

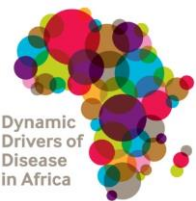
## For WNV and Dengue model

- I. Males have a higher risk of exposure than females
- II. Farmers have a higher risk compared to pastoralists

## For RVF model

- I Males have a higher risk of exposure than females

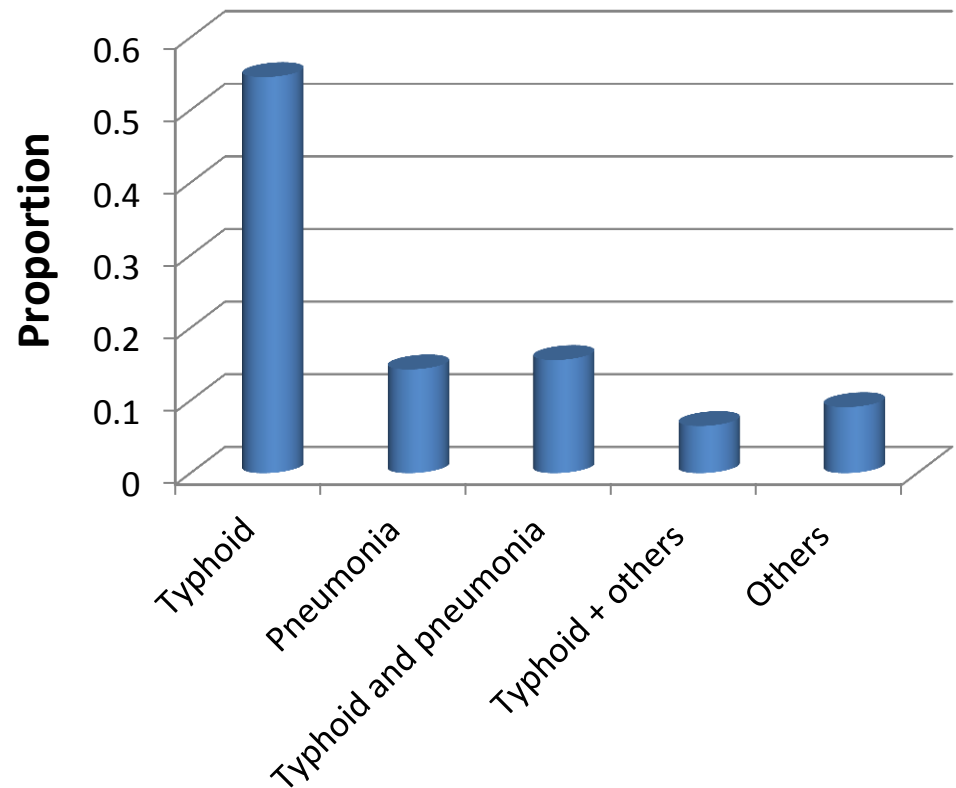




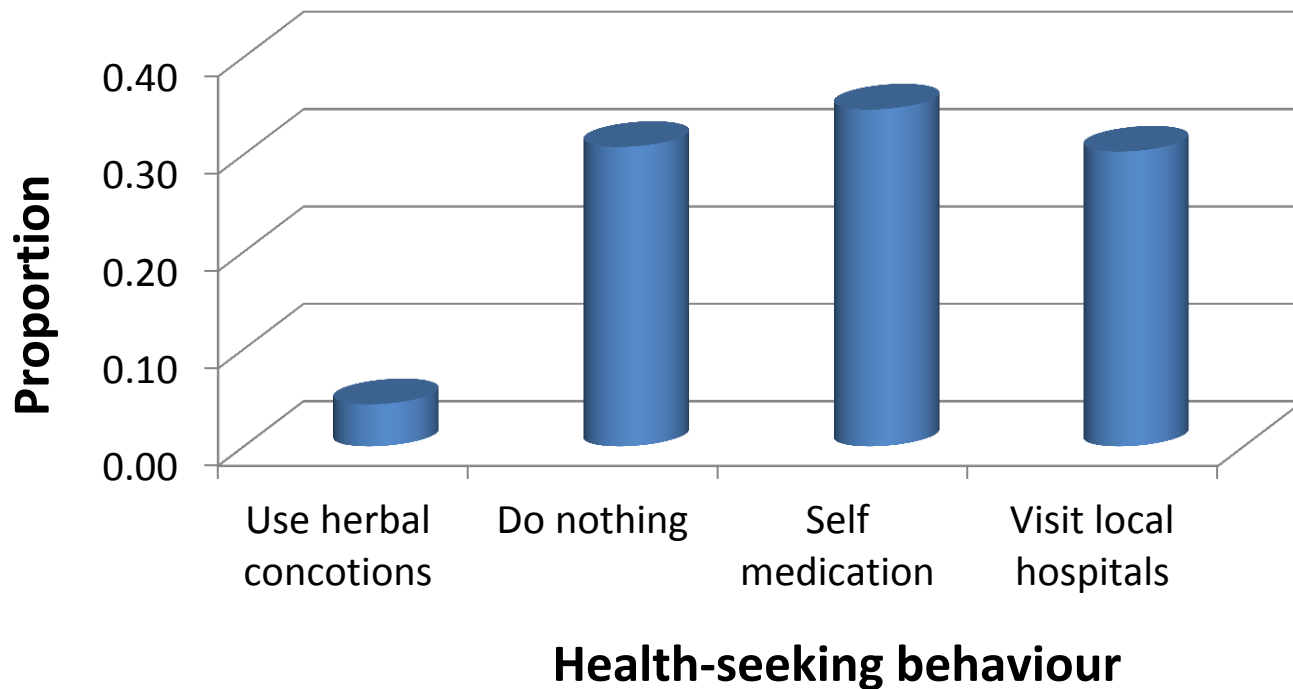
# Intervention points

- Create awareness among the local communities on infectious diseases associated with irrigation
- Build capacity on differential diagnosis of febrile illnesses in the local health centres. Currently, most cases are treated as:
  - Malaria
  - Brucellosis
  - Typhoid

*Communities' perceptions on diseases that manifest similar signs as malaria – limited knowledge on arboviruses*



- Sensitize policymakers and health service providers to make health services more accessible to the locals – at present, less than 30% of the people utilize these services

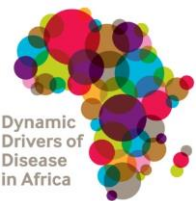


Ways in which the local communities respond to febrile illnesses such as malaria

# In conclusion

- Arboviral infections are common
- Different risk factors, such as age and occupation, are important
- Need capacity building





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# Acknowledgements

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