3RD AFRIWATSAN CONSORTIUM WORKSHOP

PROJECTED IMPACT OF CLIMATE CHANGE ON RAINFALL IN KISUMU: EVIDENCE FROM CMIP5

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INTRODUCTION

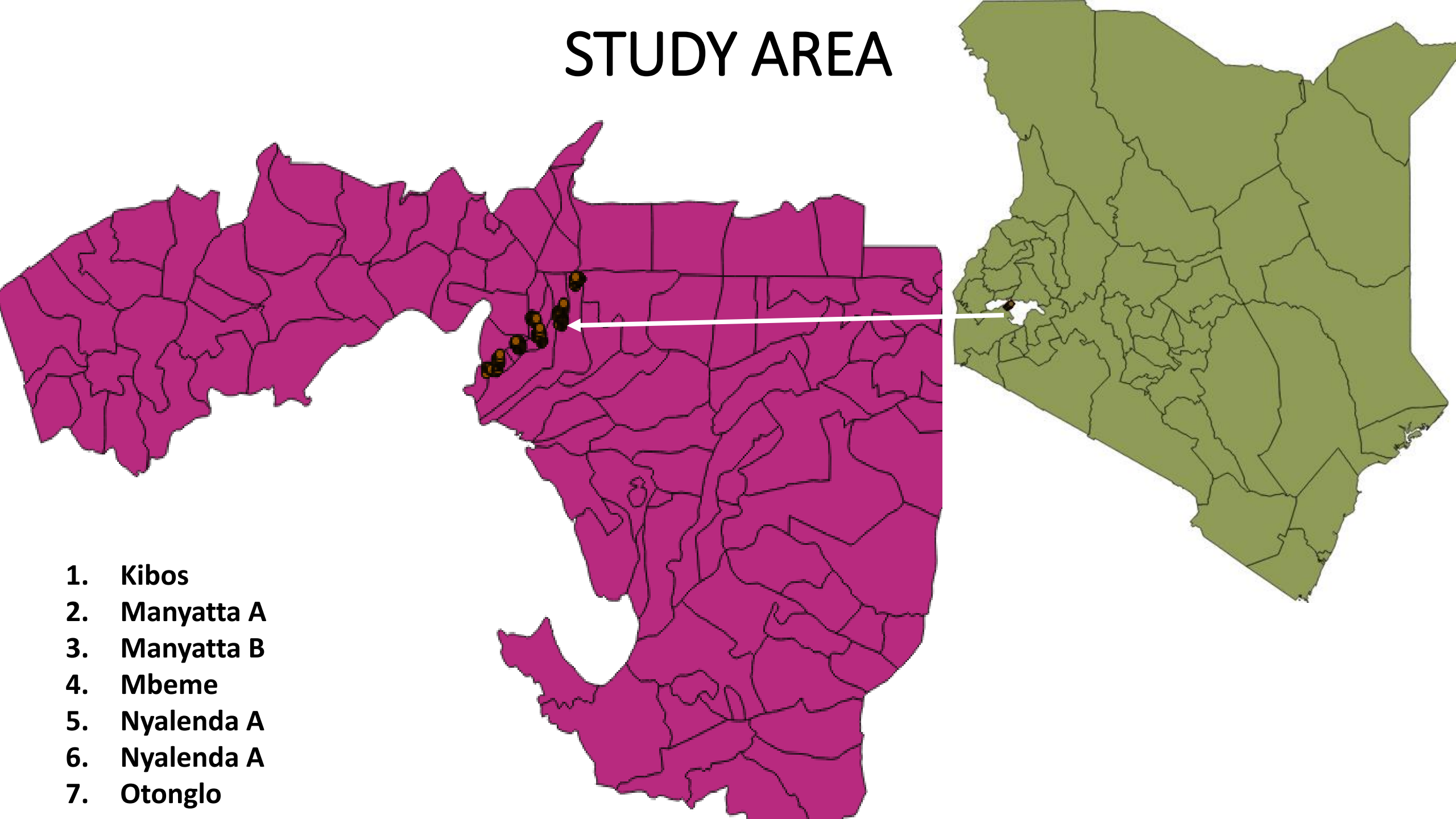
- Climate change alters the frequency & magnitude of extreme hydrological events – potentially impairing water quality

- Compromise water quality - likelihood of emergence and re-emergence of waterborne diseases

OBJECTIVES

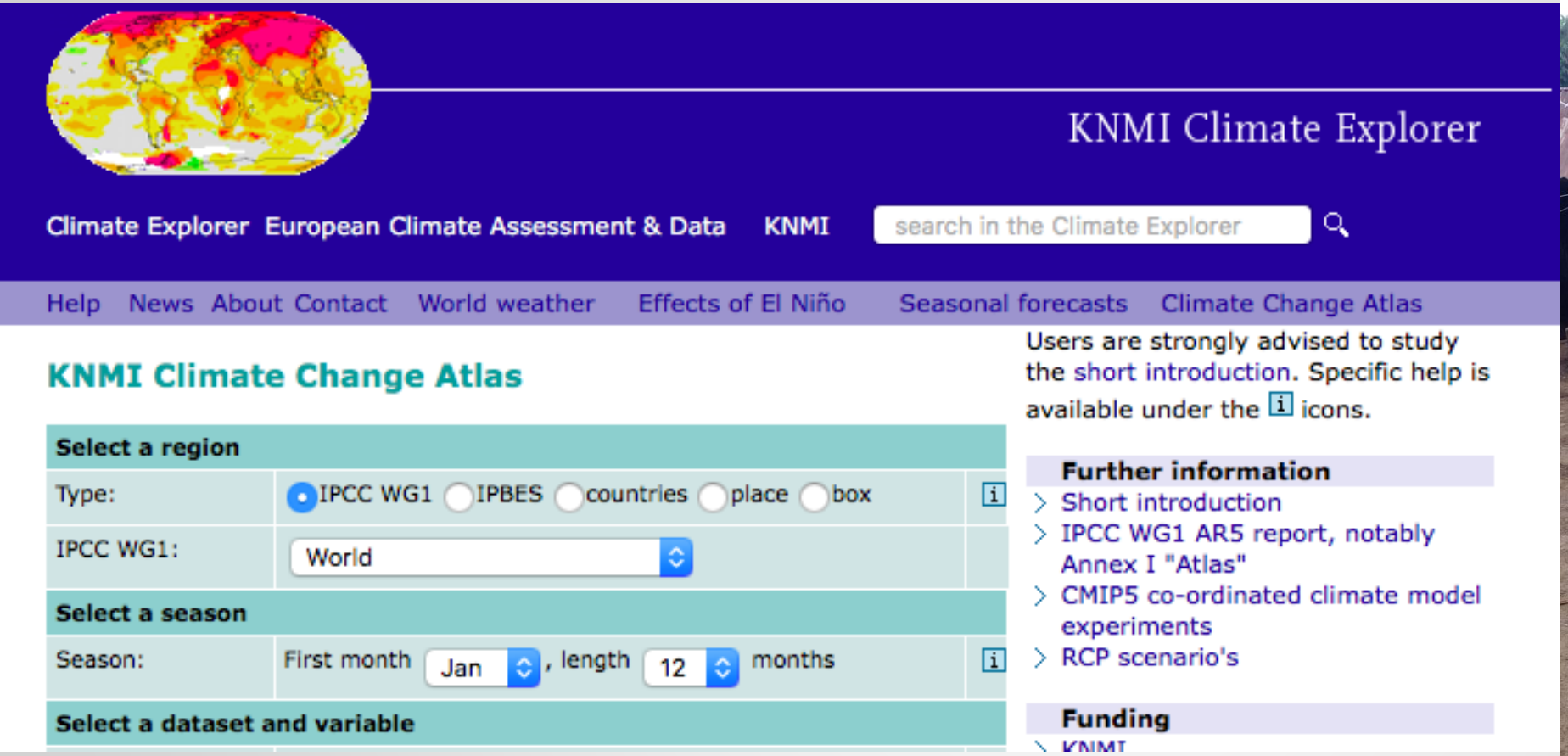
1. To assess the impact of climate dynamics on the quality of on-site domestic water
2. **To evaluate how projections of climate change may impact on-site domestic water**
3. To assess the policy implications for urban planning and management based on the projected impacts of climate change

STUDY AREA



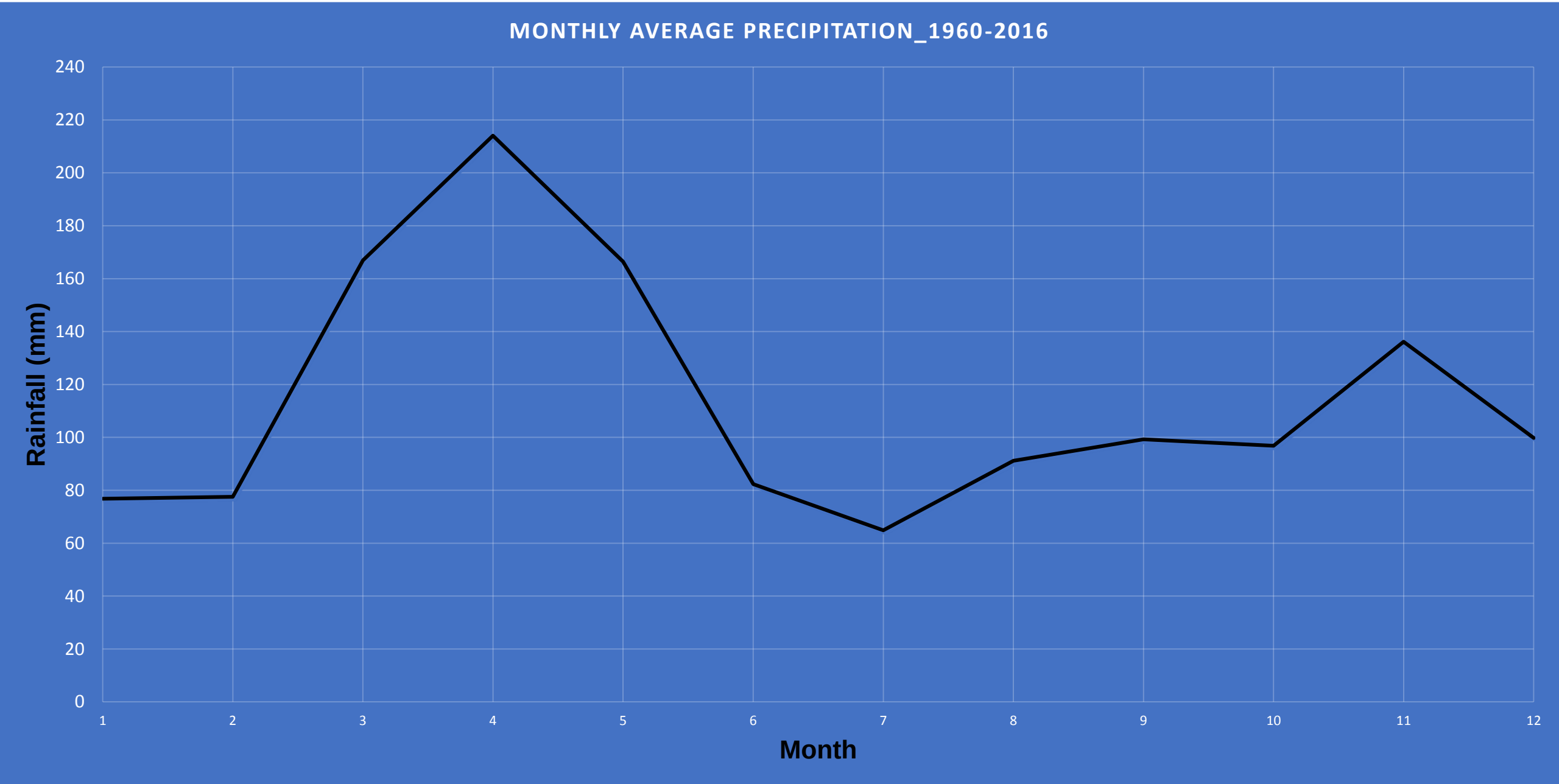
1. Kibos
2. Manyatta A
3. Manyatta B
4. Mbeme
5. Nyalenda A
6. Nyalenda A
7. Otonglo

METHODOLOGY

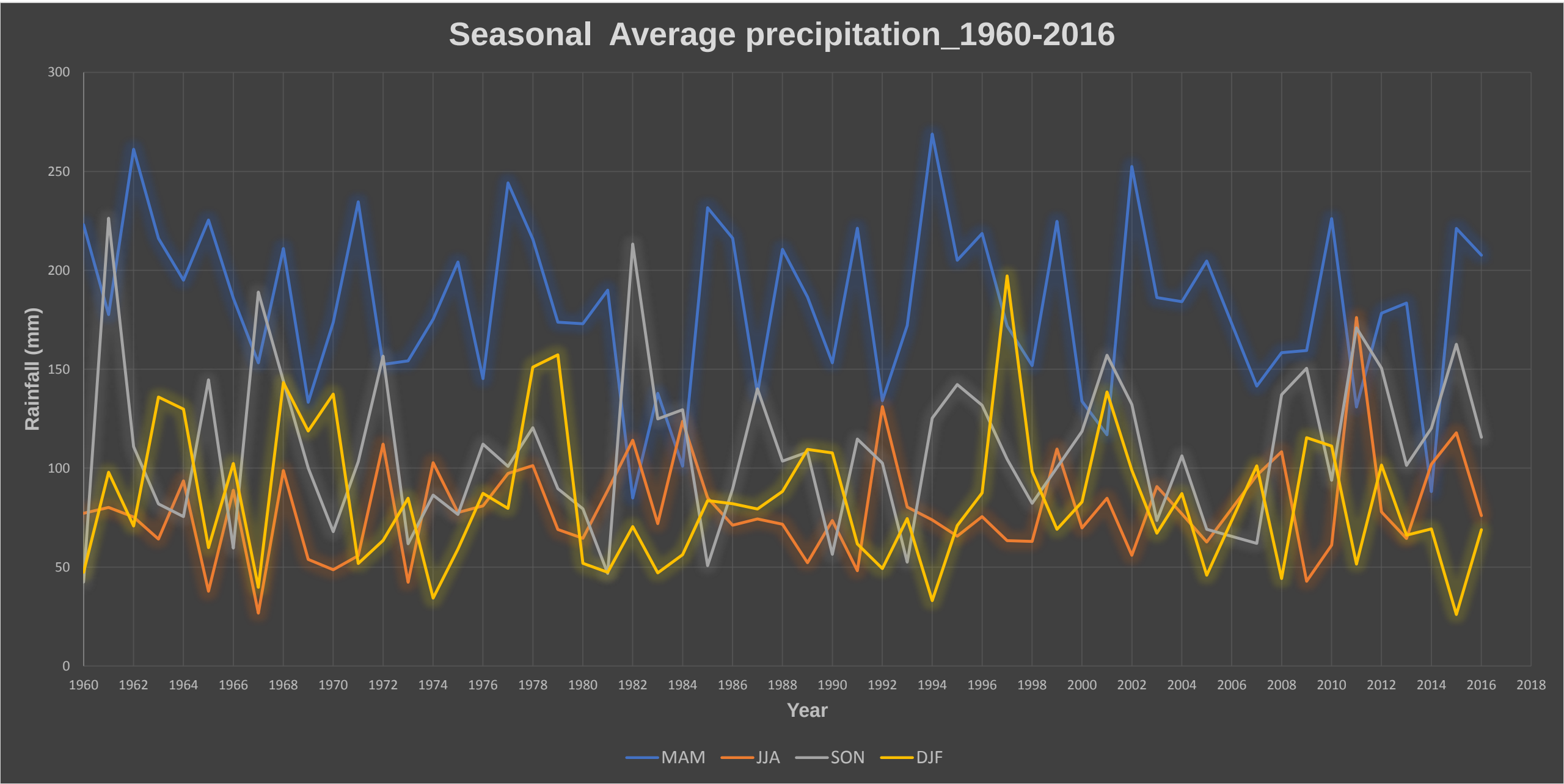


- CMIP5
- Climate data – KMD
- Household surveys - 6 sites – urban and peri-urban ; 30 HHs + Vendo
- Literature review

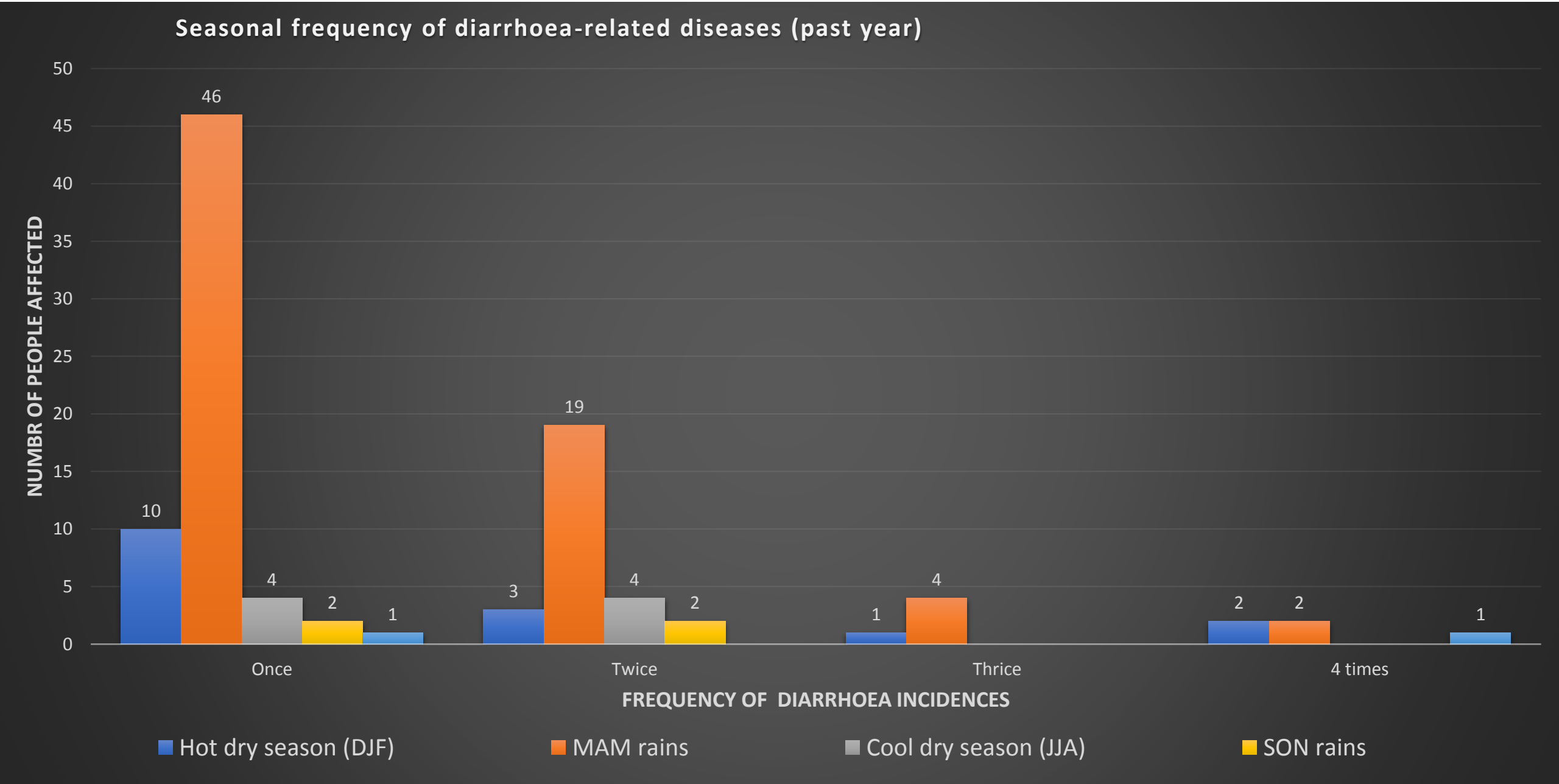
OBSERVED PRECIPITATION IN KISUMU



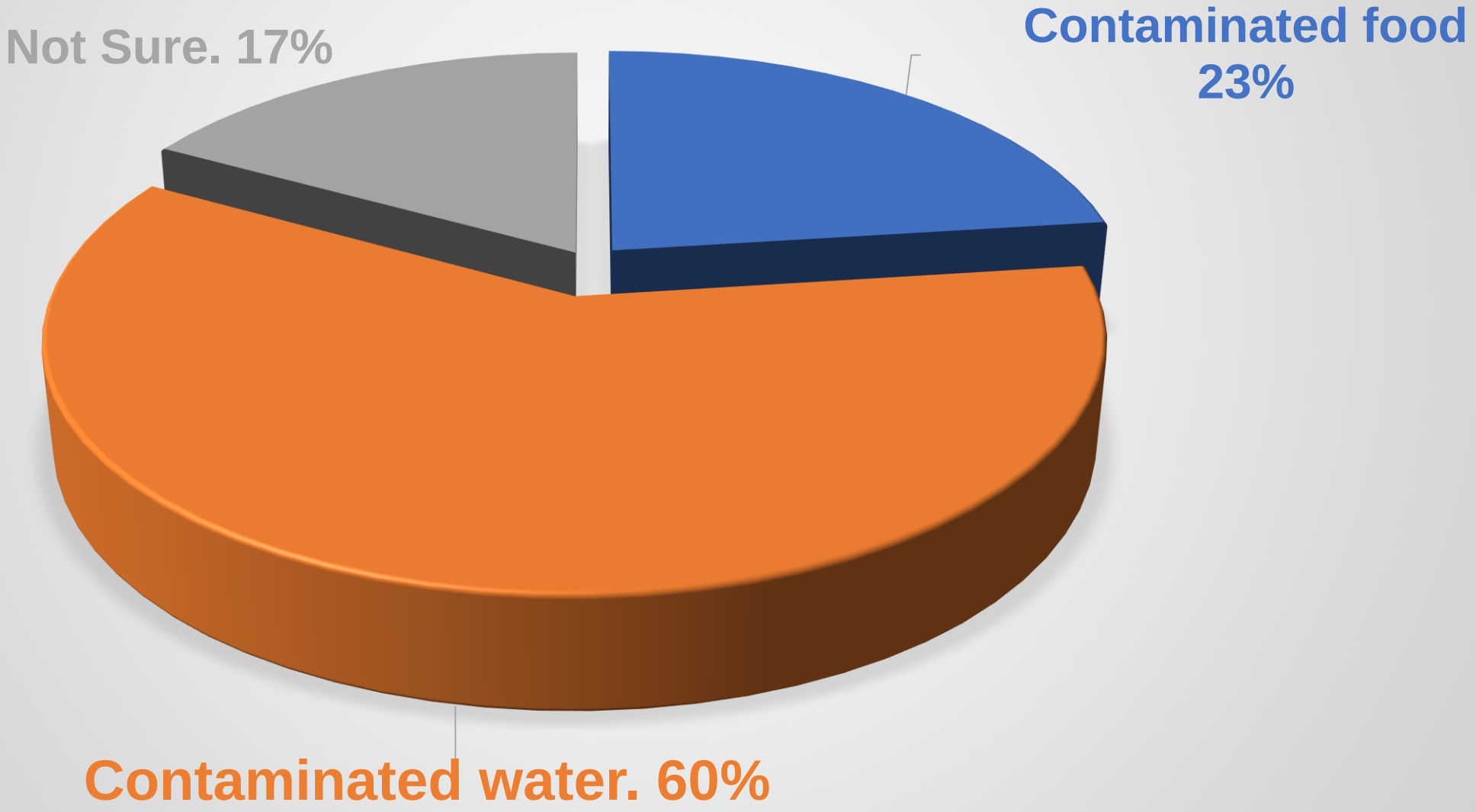
OBSERVED SEASONAL PRECIPITATION



DIARRHOEA IN KISUMU



CAUSES OF DIARRHOEA



DIARRHOEA RISK FACTORS

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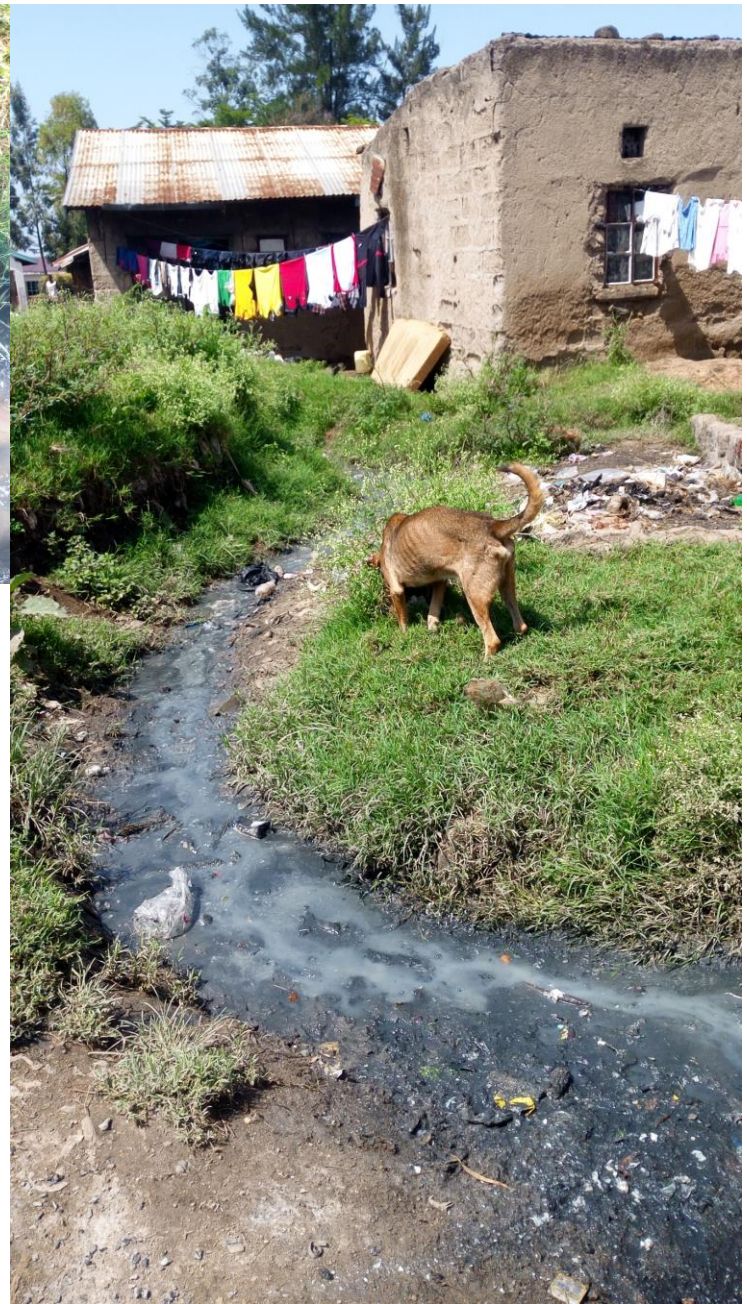


CLIMATE PROJECTIONS

Representative Concentration Pathways (RCPs):

scenarios used for the CMIP5 experiments in the IPCC AR5 report - involved around 21 GCMs/ESMs

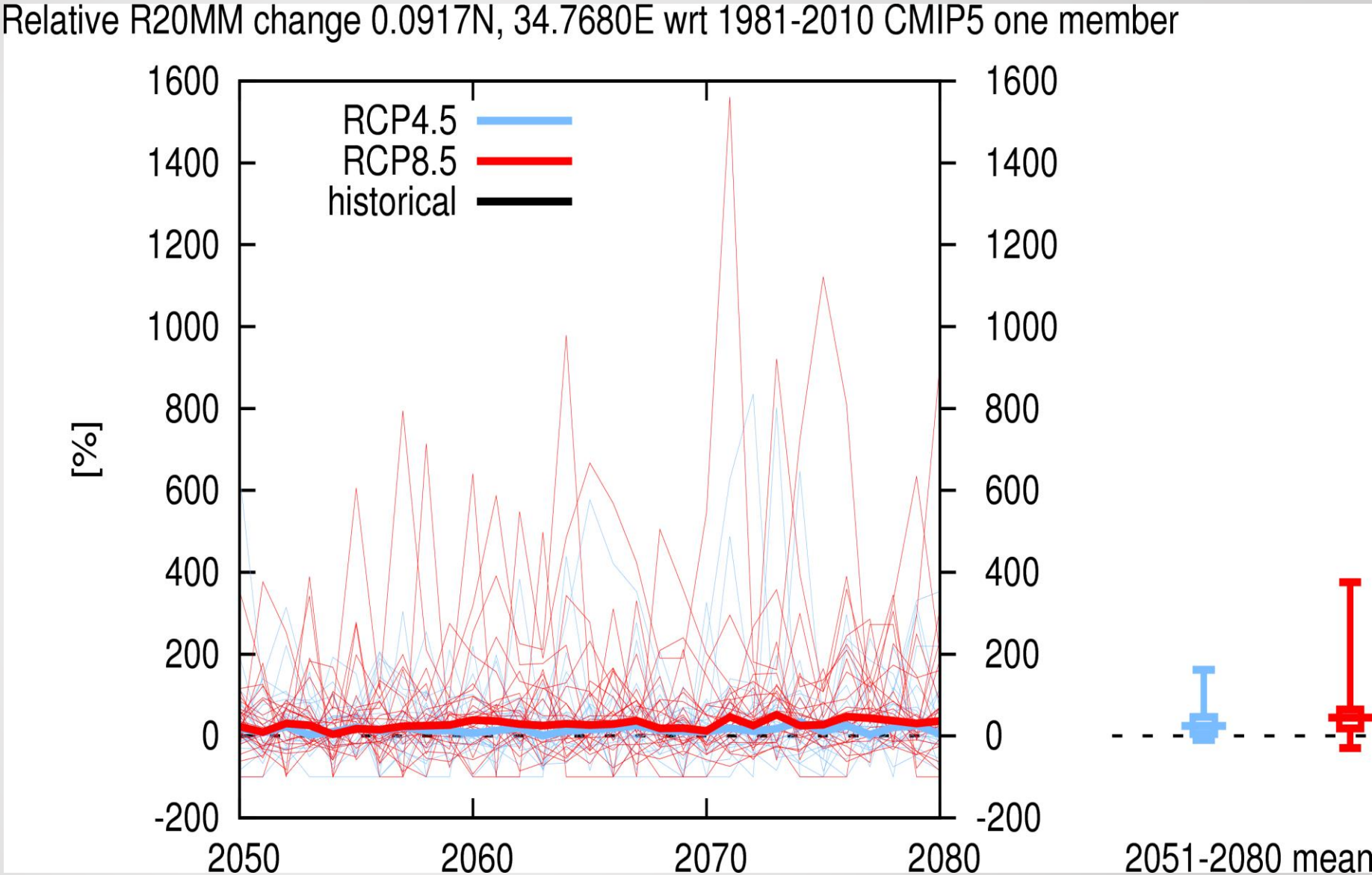
4 scenarios of which I focus on two:

i. RCP8.5 - business-as-usual scenario with increasing GHG

ii. RCP4.5 - assumes quicker action to limit GHG emissions with emissions peaking in 2040 and declining strongly until 2080

Annual count of days when precipitation ≥ 20mm

Increased runoff = increased pathogen transmission

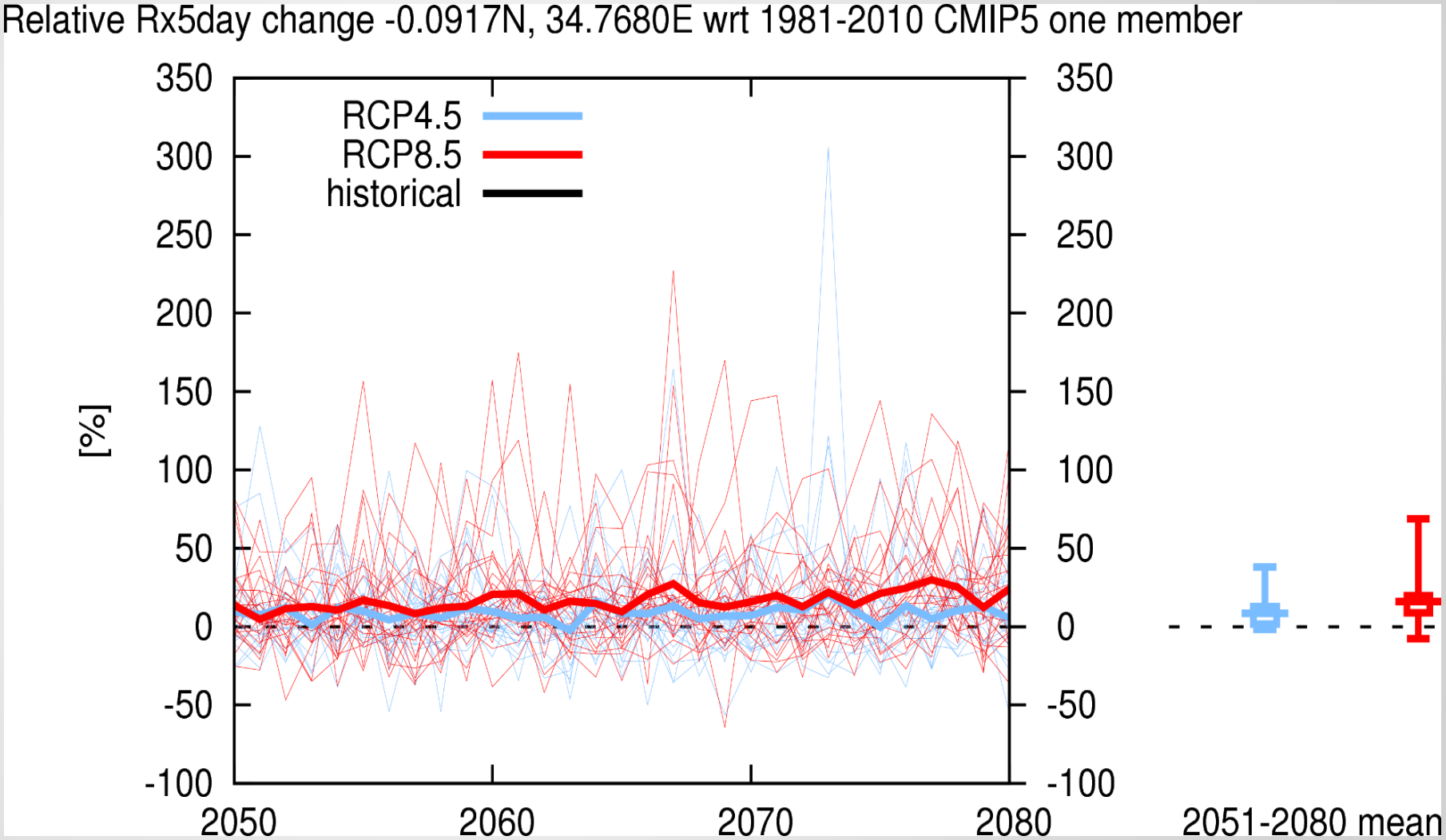


Annual maximum consecutive 5-day precipitation

Increased runoff =

Increased diarrhoea

incidences



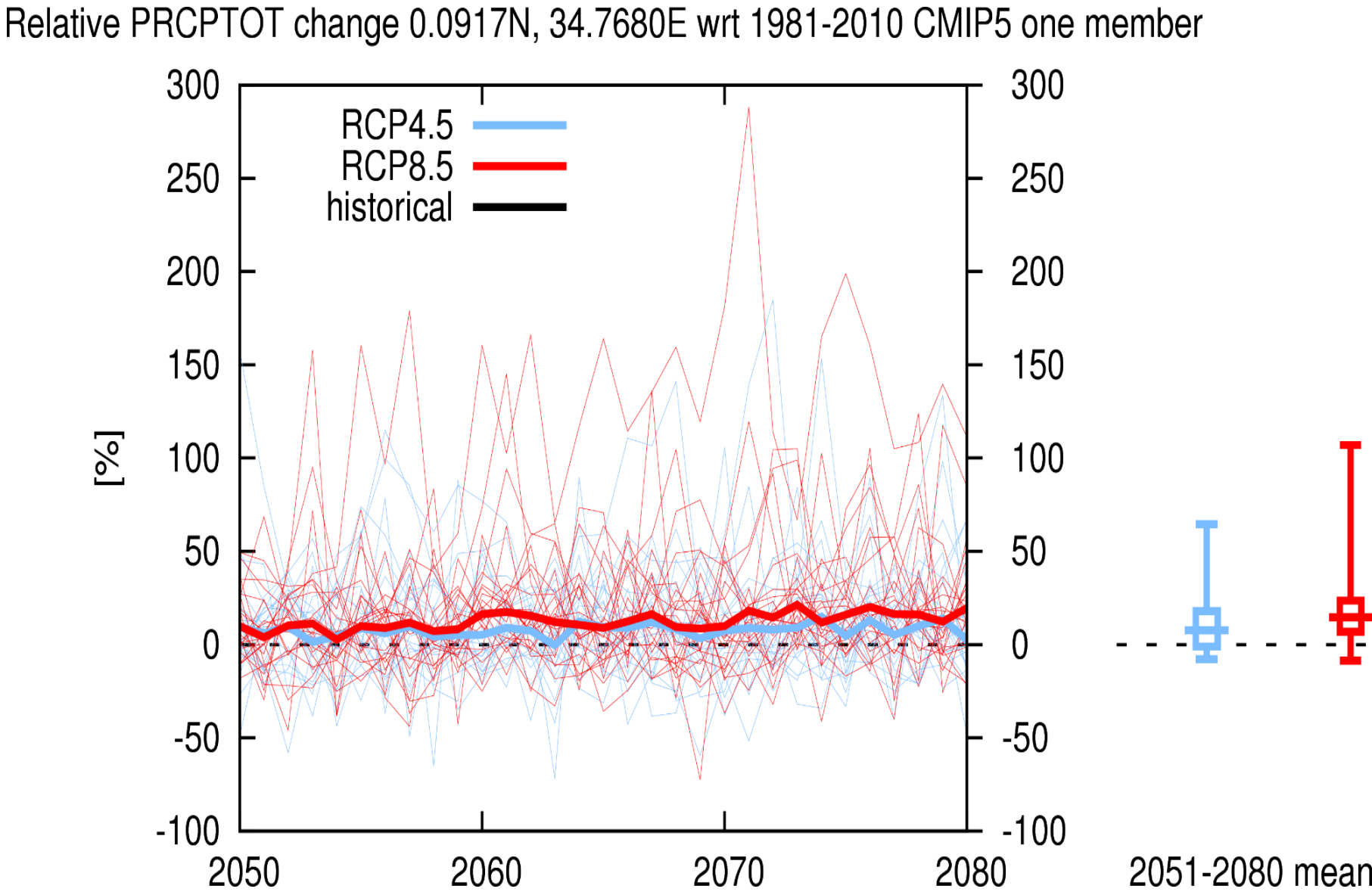
DIARRHOEA AND CLIMATE CHANGE DYNAMICS

- Rainfall has impacts on the transmission and survival of pathogens as it influences their movement from environmental reservoirs
- The frequency and intensity of rainfall events can lead to overflow of storm drains that may be combined with the sewage system resulting in a substantial amount of faecally polluted water entering directly and exposing people to bacteria from the contaminated water supply systems
- Projected changes in climate are highly uncertain but ensemble means consistently indicate more intensive rainfall for Kisumu that increases with increased radiative forcing (*i.e.* RCP8 versus RCP4.5)
- Climate variables may not always affect the number of diarrhoea cases directly but through various pathways like the changes in other non-climatic factors and extreme seasonal weather

THANK YOU!

Annual total precipitation in wet days

Heavy rainfall following wet periods=dilute the concentration of pathogens=decrease chances for pathogen transmission (Carlton et al., 2013



Annual maximum 1-day precipitation

Increased diarrhoea incidences