

# Resurgence of malaria after discontinuation of Indoor Residual Spraying of Insecticide

Saned Raouf

University of California, San Francisco

# Current Status of Malaria

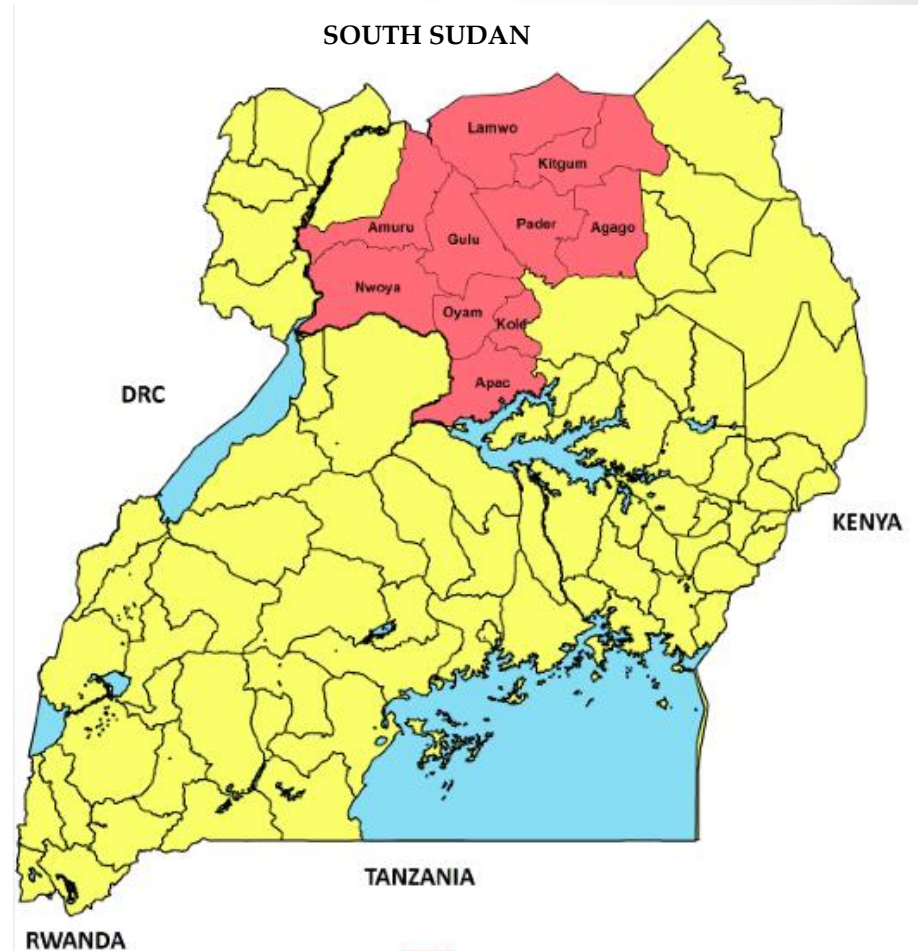
- Burden of malaria remains high: 215 million cases and 438,000 deaths in 2015. 88% of cases are in sub-Saharan Africa.
- MDG 6C aims to have halted by 2015 and begun to reverse the incidence of malaria and other major diseases
- SDG 3 aspires to ensure health and well-being for all, including an end to the epidemics of AIDS, tuberculosis, malaria and other communicable diseases by 2030.

# Current Malaria Control Measures

- Long-lasting insecticide treated nets (LLITNs) are the mainstay of malaria control in most of sub-Saharan Africa with many countries achieving universal coverage. Pyrethroids are the only insecticide used.
- IRS has been shown to be highly effective, but it is more resource-intensive and expensive to implement.
  - less than 10% of the population at risk in sub-Saharan Africa is currently protected by IRS.
  - Can use four different classes of insecticide.
  - Current knowledge of the role of IRS on endemicity rates is weak.

# IRS Operations - Uganda

- Initial operations in late 1960s showed some positive results but were then abandoned due to political strife.
- In 2008 the IRS program was established in ten districts in northern Uganda with high transmission intensity.
- In 2014, the IRS program was moved to 14 districts in the central and Eastern part of the country.

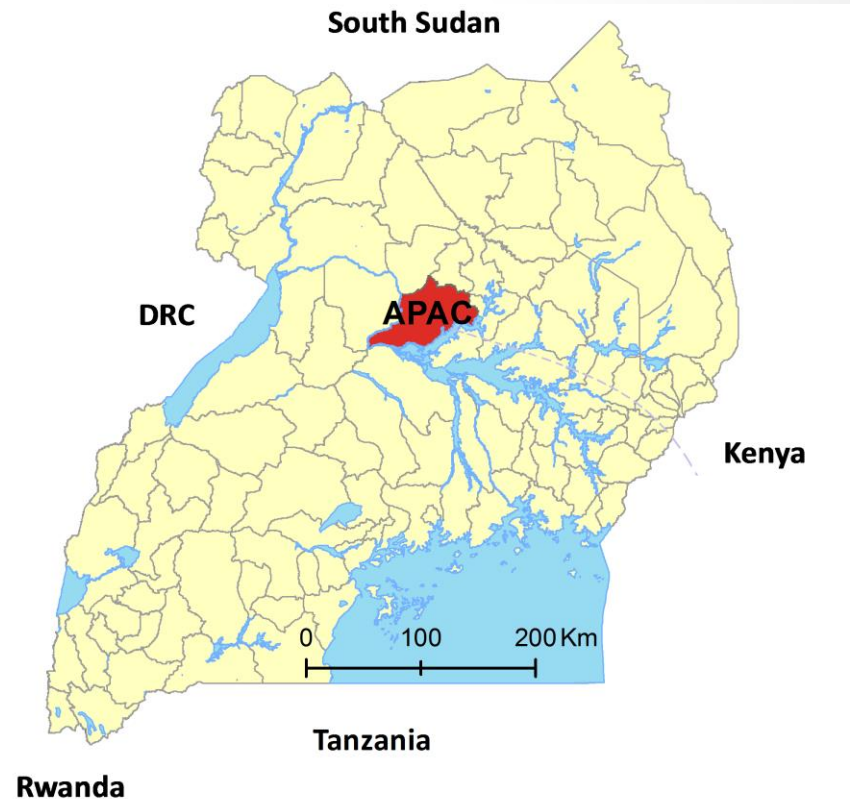


# Study Question

What happens to trends in malaria morbidity before, during, and after the implementation of IRS?

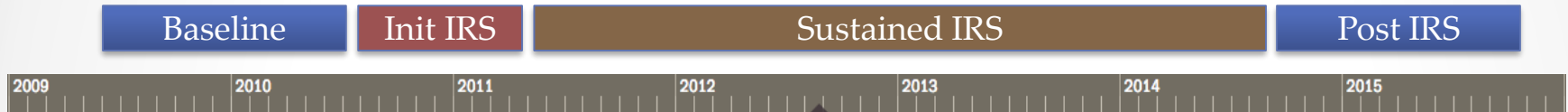
# Methods

- This study utilizes data from an enhanced health facility-based malaria surveillance program established in an setting in Apac District.
- Apac has the highest entomological inoculation rate in Uganda with over 1,500 infectious bites per person per year.



- We looked at the test positivity rate: the number of patients who tested positive among those tested.
- We then looked at temporal changes in malaria morbidity in relation to IRS over four time periods using a time series analysis.

# Temporal Trends



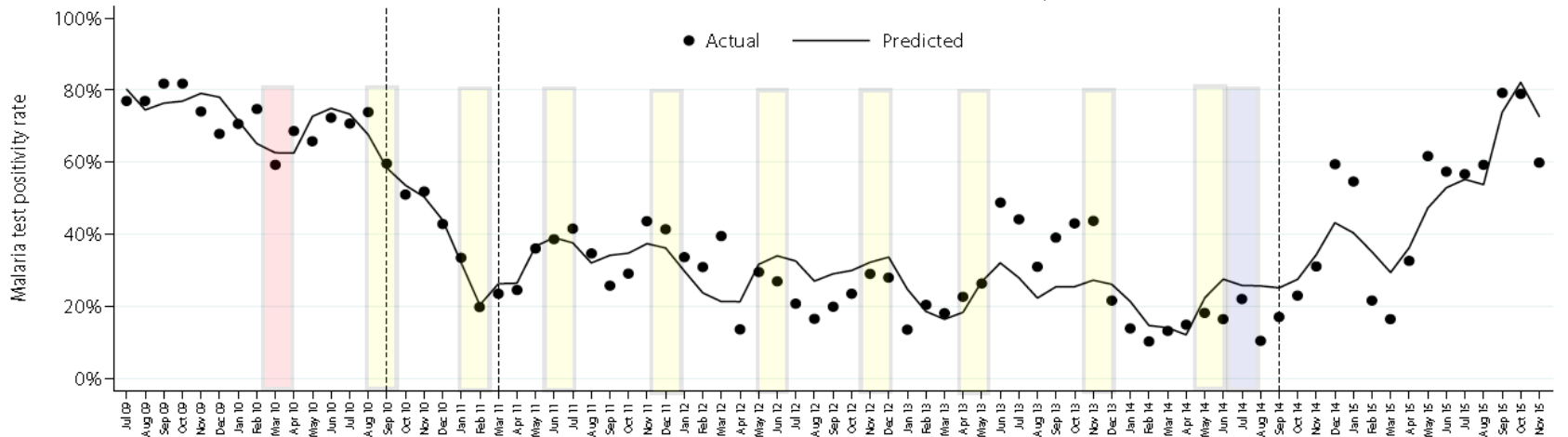
- The period of observation extended from July 2009 through November 2015:
  - baseline period (July 2009 – August 2010)
  - an initial period of effective IRS (September 2010 – February 2011)
  - sustained period of effective IRS (March 2011 – August 2014)
  - the 4-18 period following after IRS was discontinuation (September 2014 – November 2015)



# Results

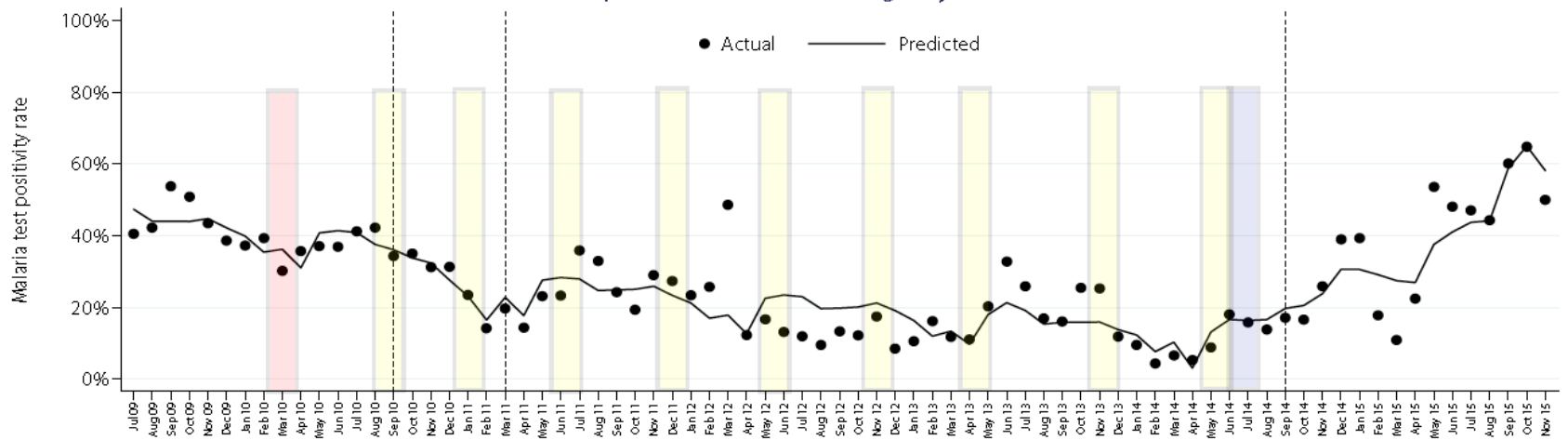
- Over the 77 month observation period, there were 126 260 patient encounters at the outpatient facility of which 67 634 (53·6%) were suspected of having malaria. Among patients with suspected malaria, 65 421 (96·7%) of patients with suspected malaria underwent laboratory testing.

### Outpatient surveillance – age less than 5 years



■ alpha-cypermethrin  
■ Bendiocarb

### Outpatient surveillance – age 5 years and older



alpha-cypermethrin  
 Bendiocarb

# Lessons Learned

- Implementation of IRS with the carbamate bendiocarb was associated with a rapid and marked decline in the malaria morbidity among outpatients.
- TPRs however, began to rise four months after IRS was discontinued, reaching pre-IRS levels within 18 months despite universal LLITN coverage.

# Next Steps

- IRS works in areas of high transmission.
- Current gains in malaria reduction cannot be sustained if control measures are withdrawn or implemented based on limited data.
- Further research needs to be done to develop best practices of implementation of IRS in areas of high transmission, including exit and long-term strategies to prevent resurgence of malaria and to reduce the morbidity and mortality of the disease.

# References

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