Anomalous precipitation as a factor for the spatio-temporal distribution of RVF in Uganda

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Context

- RVF is an arboviral zoonosis associated with climate anomalies (Davies et al., 1985)
- Increased precipitation results in an increased availability of breeding sites for the RVFV infected mosquitoes (Linthicum et al., 1983) and subsequent virus transmission to domestic animals (Anyamba et al., 2001).
- First RVF outbreak in Uganda recorded in 2016 since 1968 following anomalous high rainfall events (Shoemaker et al., 2019), but not all high rainfall events trigger outbreaks
- The study aims to determine the how rainfall patterns precipitate an outbreak

Innovative ways of working

- Spatio-temporal statistical models for forecasting risk
- Using R software to analyze satellite CHIRPS (Climate Hazard Infrared Precipitation with Station data)

Research contribution

- Guidance to policy makers on outbreak prediction and cost-effective risk-based control options
- Better human health, animal health & production

Next steps

- Complete analyses of all outbreaks for precipitation, Temp, NDVI, Human and livestock populations

Methodology

- Rainfall anomalies were calculated by first obtaining mean rainfall values for each month separately using CHIRPS data for the period Jan 1981 to Dec 2015 to analyse all the outbreaks in Uganda since Mar 2016
- Standard deviation for each of the mean values by month was calculated
- Standardised difference, by month, of rainfall values from Jan 2016 to May 2021 was obtained
- Values from 0 to 2 suggest that rainfall estimates are within normal levels, while those between -2 to 0 indicate below normal precipitation and those >2 indicate above normal precipitation (Araújo et al., 2009)

Findings

- Results indicate that it is not just a peak of rainfall but how long the rains last e.g. in the 2018 outbreak where it lasted longer
- The 2016 outbreak occurred at the peak of rains while the 2018 and 2021 outbreaks occurred after a short period of dry spell

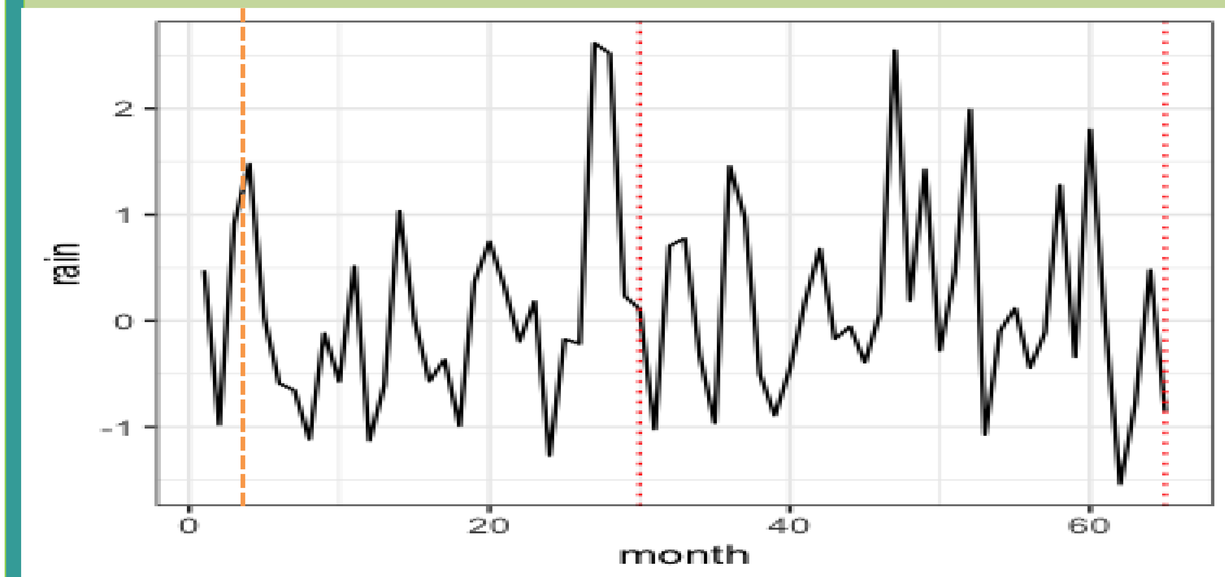

Fig 1: Rainfall anomalies for areas that have reported RVF outbreaks in Uganda between June 2018 and May 2021. The vertical dotted line (in red) identifies periods when outbreaks were reported (June 2018 and May 2021).

References

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Conclusion

- Anomalous high rainfall events are necessary but not the only cause of RVF outbreaks.
- Need to analyse other ecological variables e.g. Temp, NDVI, Soil types, livestock populations and movement dynamics
- Why were there no outbreaks at some peaks?
- hypothesis – surveillance did not pick up cases?; duration was short?

Un answered questions:

- What peak of rainfall should trigger an outbreak?
- How long should the rainy season last before an outbreak occurs?
- How long should a dry spell last before an outbreak occurs?

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