FMD Week2010

eufmd

Descriptive and Spatiotemporal Analyses of Foot-and-Mouth Disease in Tanzania From 2001 to 2006

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FMD in Tanzania

- Endemic with outbreaks occurring each year
- Established serotypes
  - Type A & O; and SAT I & II
- Persistence is due to;
  - Extensive interactions between livestock and wildlife
  - Movement of livestock within and across international borders

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- FMD surveillance – passive
- Diagnosis
  - mainly clinical sings; very little samples are taken
- Control measures
  - Vaccination, and movement control
- National objective – to control FMD as part of national poverty alleviation strategies,
- but we need to know the FMD dynamics and spatiotemporal patterns of transmission

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Study methodology

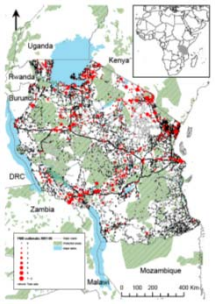
- **Objective**
  - **Improve the current knowledge on the dynamics and factors related to FMD occurrence, so control measures can be implemented more efficiently.**
- **Data**
  - **i. Passively collected FMD data – 2001 – 2006**
  - **ii. GEOnet – list of all villages in Tz**
  - **iii. World data base on protected areas**
  - **iv. ArcGIS & TADinfo**

Methodology

- **Analyses**
  - **i. Villages were the unit of analysis**
  - **ii. Extraction maps- used to determine high density distribution of FMD outbreaks**
  - **iii. Spatio-analyses were conducted using the package;**
    - **SatScan**

Results

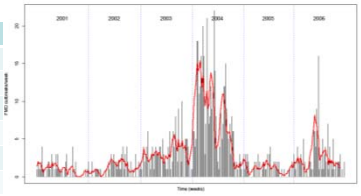
- 878 – FMD outbreaks in 605 villages were reported
- The number of outbreaks per location ranged from 0-9 and;
- FMD affected villages were mainly located on the borders, northern and central areas;
- Very few outbreaks were reported in the south or inside protected areas



Results

- Variable outbreaks

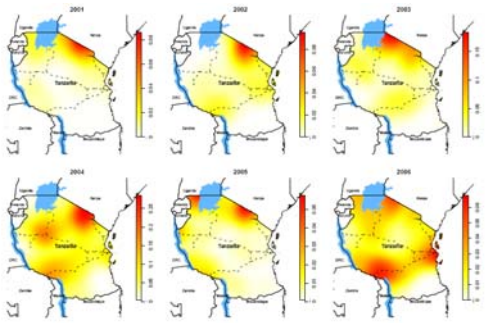
Year	FMD outbreaks
2001	52
2002	62
2003	160
2004	410
2005	59
2006	135

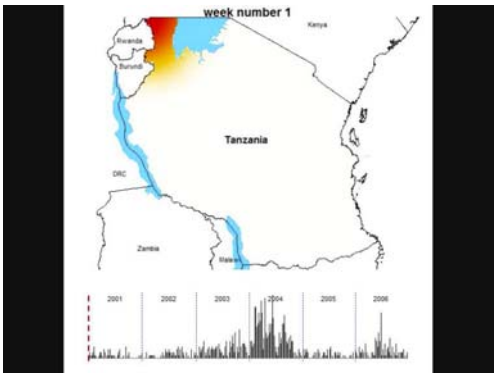


Temporal distribution of FMD outbreaks for the 2001 – 2006 reporting period

Results

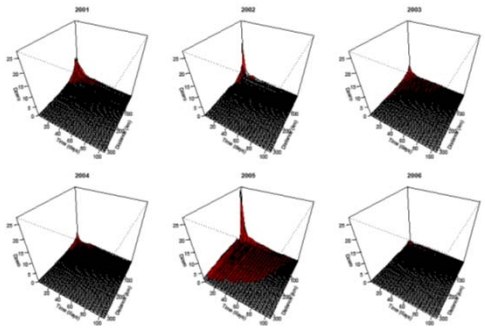
- Spatial distribution
  - i. Uneven
  - ii. Highest density recorded in 2003 & 2004;
  - iii. Located mainly in border with Kenya





The spatio-temporal interaction

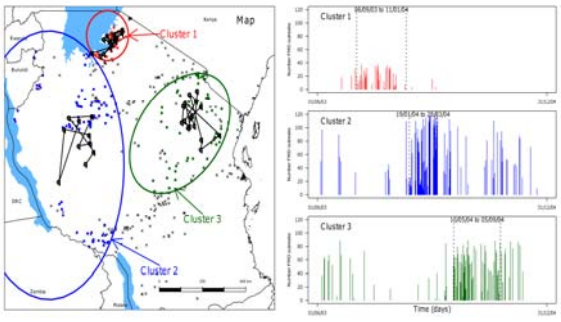
- Significant ($P \leq 0.01$)
- FMD affected villages were clustered at 80-100km in 2001 and 2002, but 2001 had a larger temporal component (50days)
- In 2003 there was an increase of the clustering in both dimensions which would indicate an increase of the infectiousness in time (65days) and space (200km)
- 2004 limited clustering ≈ 2001
- 2005 intense clustering at shorter distances (30km) and time (5days)
- 2006 – generalised distribution of FMD affected villages



Satscan analysis

- Three statistically significant clusters
  i. From 08/09/2003 to 11/01/2004; affecting 47 villages (RR = 7.97; $P \leq 0.001$)
  ii. From 19/01/2004 to 28/03/2004 affecting 99 villages (RR = 2.76; $P \leq 0.01$)
  iii. From 10/05/2004 to 05/09/2004 affecting 86 villages (RR = 2.72; $P \leq 0.01$)
- The spatio-temporal clusters were consecutive in time

SatScan + Mean centre



Discussion

- Data limitation – underreporting + clinical
- First time passive surveillance data used to model spatiotemporal dynamics in Africa
- Wildlife may play a role in maintaining and spreading the disease in the region BUT
- Clustering in border areas and communication networks would indicate that FMDV transmission was primarily related to human activity.

- The observed complex epidemiological dynamics → control is difficulty
- Control measures → regional approaches
- Many control options but zoning is probably the best option
  – Using the major railway lines as reference four major zones could be delimited;

FMD zone 1

- **FMD endemic area**
  – North of the central railway line (the Maasai ecosystem and the lake Victoria basin)
  – FMD control is challenging
  – Efforts to improve the knowledge on FMDV persistence in the pastoralists herds

FMD zone 2

- **FMD epidemic area**
  – Between the central and Tanzania-Zambia railway lines, where the number of cases increase during epidemic phases.
  – Surveillance need to be improved to detect the disease at early stages and
  – control of propagation along the international borders and communication networks

FMD zone 3

- Low density FMD area
  - South of the Tanzania-Zambia railway line, especially the Mtwara corridor
  - Potential FMD free zone
  - Strict active surveillance
  - Strict movement control
  - Vaccination of all susceptible livestock in the area

FMD zone 4

- FMD free area
  - The islands in the Indian ocean
    i. Pemba
    ii. Zanzibar
    iii. Mafia
- FMD free zone or holiday resorts?

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Thank you
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