

# Sero-epidemiological investigation of foot and mouth disease (FMD) in cattle at the livestock-wildlife interface in Maasai Mara, Kenya

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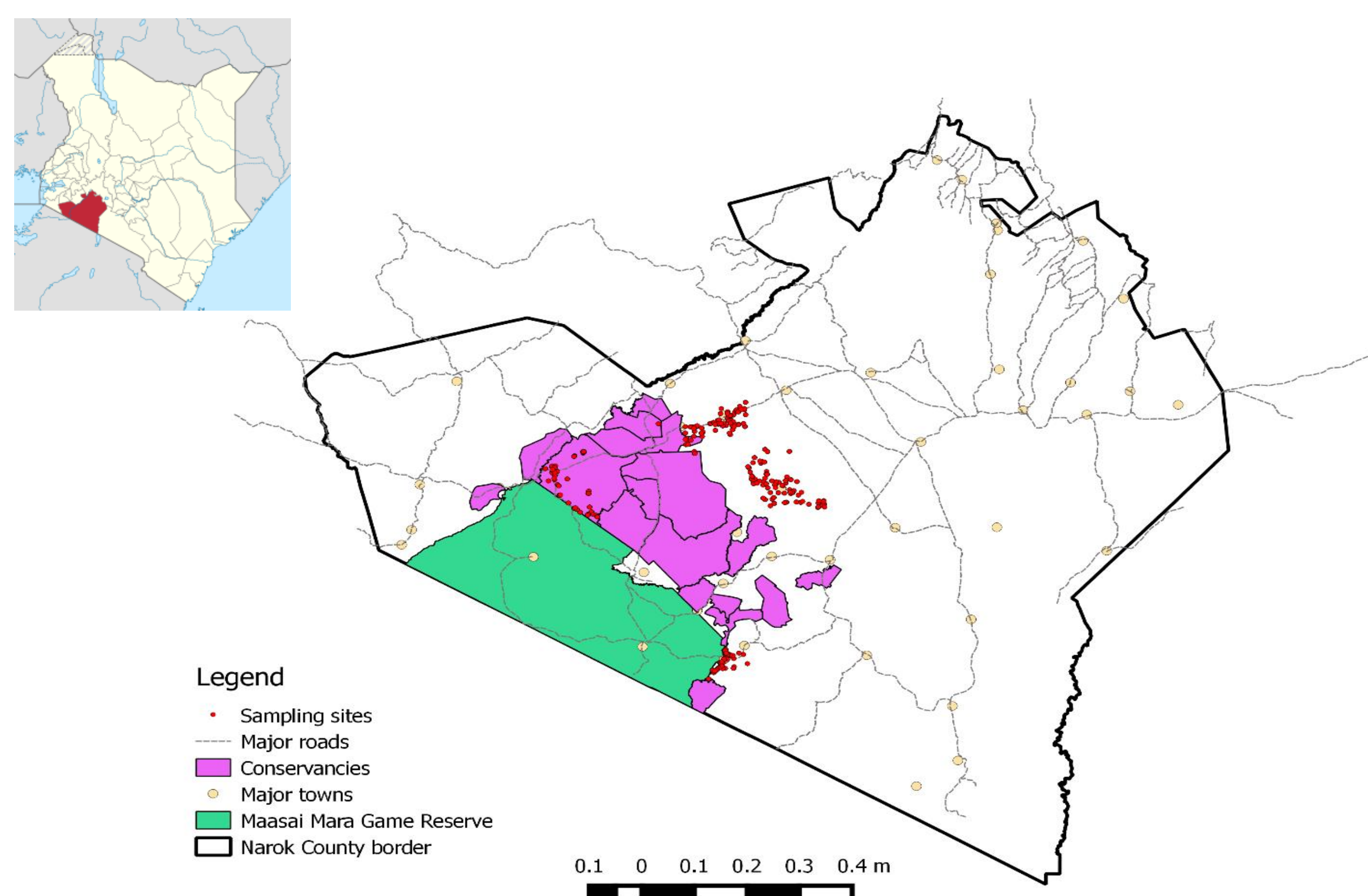
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## Introduction

- Land use changes affect the transmission dynamics of many infectious diseases that constraint livestock production.
- Using FMD as a case study disease, we investigated the effects of varied land use types and different levels of livestock-wildlife interactions on its transmission patterns in Maasai Mara ecosystem, Kenya.
- The study used a cross sectional study design and multi-stage cluster sampling framework to estimated FMD seroprevalence and the associated risk factors for exposure in pastoral cattle herds.

## Methods

- Three ecological zones were identified along a distance gradient from Mara National reserve (Fig 1).
- The increasing distance from the reserve correspond to different levels of wildlife-livestock interactions and varied land use types.



- A total of 1170 cattle were randomly sampled from 390 herds and screened for FMD non-structural antibodies (NSP) using a 3ABC blocking Elisa (Priocheck® FMDV NS, Prionics AG, Netherlands).
- Seropositive sera was further screened for serotypes A, O, SAT 1 and SAT 2, all endemic in Kenya.
- A generalized linear mixed effect model (GLMM) was used to analyze seroprevalence data and identify risk factors for exposure; herd ID was fitted as a random effect to account for herd-level clustering.

## Results

- The overall individual-level seroprevalence of FMD was 81.2% (95% CI: 79.1 - 83.5).
- FMD Seroprevalence was inversely related to the ecological distance from Mara Reserve; Zone 1 (92.0, 95% CI: 89.9 – 94.5) than in zone 2 (79.8, 95% CI: 76.3 – 83.5) and zone 3 (62.9, 95% CI: 57.1 – 69.5).
- Cattle herds grazed in zones 1 and 2, respectively, had higher odds of FMD exposure (OR = 8.8, 95% CI: 5.1 – 15.4,  $p < 0.001$ ) and (OR = 2.7, 95% CI: 1.7 – 4.3,  $p < 0.001$ ), than those grazed in zone 3 (low interface area).
- Other significant predictors of animal-level FMD seroprevalence included; sharing of watering points within villages (OR = 4.8, 95% CI: 1.8-13.2,  $P = 0.002$ ), mixing of cattle with other herds during grazing (OR = 3.3, 95% CI: 1.9 – 5.6,  $P < 0.001$ ), pastoral herd management practices (OR = 5.3, 95% CI: 3.3 – 8.4,  $P < 0.001$ ), grazing cattle in wildlife reserves (OR = 4.5, 95% CI: 2.8 – 7.1,  $P < 0.001$ ) and large herd size  $> 50$  animals (OR = 1.6, 95% CI: 1.0 – 2.4,  $P = 0.035$ ).
- Serotypes O, A, SAT 1 and SAT 2 were all prevalent in the target zones.
- The Intracluster Correlation Coefficient, ICC (i.e., the level of dependence among seropositive cattle individuals within herds) was estimated at 0.34.

## Conclusion

- This study highlights important risk factors for FMD transmission and will help in the establishment of mitigative strategies.
- Further research should characterize circulating FMD viruses for the development of effective vaccines and build communities' capacity for sustained control .

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