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Land cover change and transmission of Lassa, Ebola and other zoonotic pathogens in Macenta, Guinea: integrating spatial and serological data to detect spillover risks

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Introduction

Guinea is an emerging economy where land use change through agricultural activities and hunting practices are widely acknowledged to be key drivers of disease emergence. Ecological mapping of Guinea places the forested region as hot spot for zoonotic pathogen transmission. To date, there is little actionable information on how land management and agricultural development strategies can reduce pandemic risks in low- and middle-income countries. Understanding where and when cross-species transmission events occur can provide new opportunities for emerging and re-emerging disease surveillance and inform the design of sustainable landscapes.

Methods

To investigate potential asymptomatic infections in the study zone, serum samples were collected from 517 healthy volunteers within 47 villages. We performed enzyme linked-immunosorbent assay (ELISA) and Western blot assays for antibody detection and a significant number of seropositivity were detected for Lassa, Ebola, Marburg and other pathogens [1]. Alternatively, wildlife samples were collected and human movement pattern relative to landscape were considered to understand human interaction with wildlife through daily activities to define hotspots.

Results

Serum samples were processed using ELISA, western blot and multiplex beads array assay technics and show number of antibody response to Lassa virus, Ebolavirus, Marburg virus and SARS-COV-2-like virus. Additionally, bat faecal samples were screened using hemi-nested PCR and confirmed by metagenomic sequencing. Findings revealed different subtypes of Ebolavirus, bat coronaviruses, Henipa viruses, Morjiang virus, a SARS-COV-2-like virus and several novel coronaviruses. Finally, the human movement pattern relative to landscape data likely indicates hotspots where human and wildlife interactions occur.

Conclusion

This study was done in collaboration with the university of Oxford, UK. It intends to improve disease surveillance in Guinea and enhance the capacity of public health systems to detect, monitor, and respond to infectious diseases.