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INAUGURAL ONE HEALTH CONFERENCE

1 - 3 November 2021

# Contribution of the MERS-CoV Research to One Health Operationalization in Ethiopia and Kenya


## Stella Kiambi

**Deputy Country Team Leader**

**Emergency Centre for Transboundary Animal Diseases, FAO, Kenya**

# ACKNOWLEDGMENTS

## Many people have contributed to this project:

Government of the Federal Democratic Republic of Ethiopia

REPUBLIC OF KENYA

ግብርና ሚኒስቴር
Ministry of Agriculture

ጤና ሚኒስቴር - ኢትዮጵያ
MINISTRY OF HEALTH - ETHIOPIA

# BACKGROUND

## Middle East Respiratory Syndrome Coronavirus (MERS-CoV)

- Novel coronavirus that emerged in 2012 – Saudi Arabia
- Severe acute respiratory illness in humans – require hospitalization
- Dromedary camels (*Camelus dromedarius*) - considered primary reservoir host
- >2500 human cases
- >900 case fatalities
- In camels – subclinical → surveillance challenge!

At a watering point in Isiolo, Kenya during MERS data collection mission, 2018

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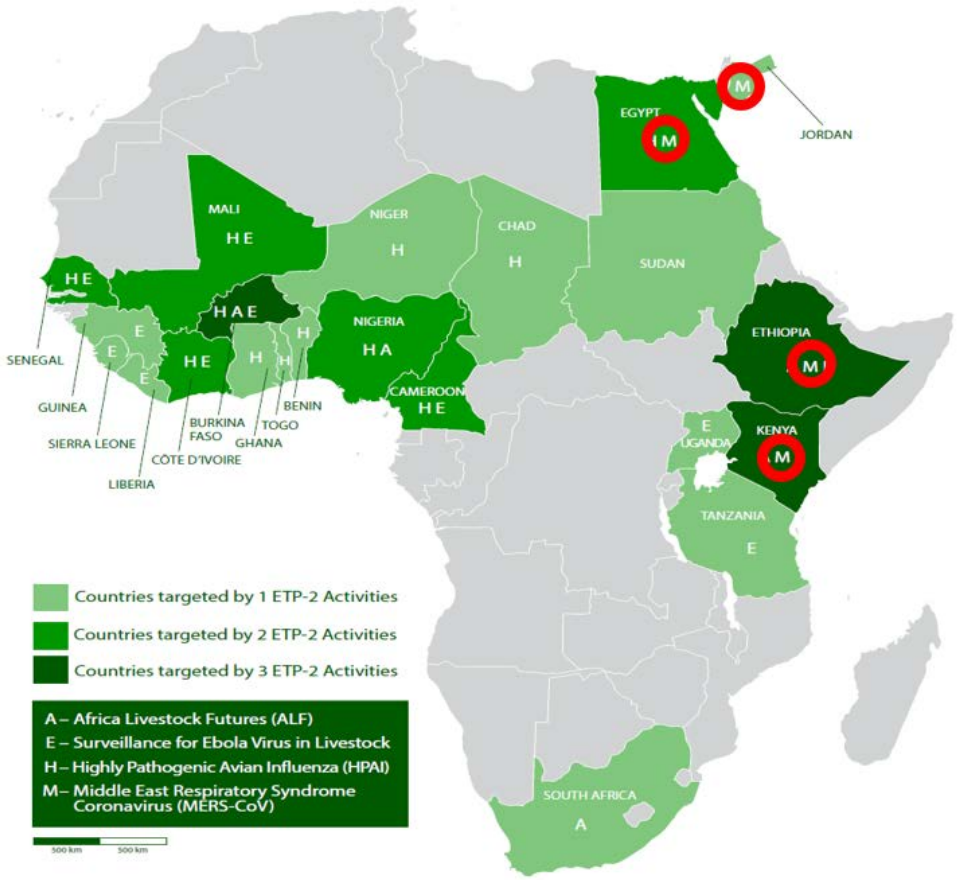
# FAO & MERS-CoV




## WHAT

**Emerging Pandemic Threats (EPT-2) Programme**

- USAID funded
- Egypt, **Kenya**, Jordan and **Ethiopia**
- Oct 2015 – Sept 2022

## PROJECT OBJECTIVES

1. Generate data and knowledge on MERS-CoV
2. Improve MERS-CoV surveillance capacity
3. Contribute to One Health Operationalization

## OUTCOME

Contribute to global efforts to reduce zoonotic transmission of MERS-CoV

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# THE SURVEILANCE APPROACH

## Objective 1: “MERS-CoV circulation in dromedary camels”

**National consultations & Establishment of MERS TWGs**

**Understand camel value chains**

**Cross sectional surveillance**

Repeated sampling 5-10 days

**Repeated cross sectional slaughterhouse studies**

**Longitudinal surveillance**

Repeated sampling 10-14 days

**Longitudinal cohort studies**

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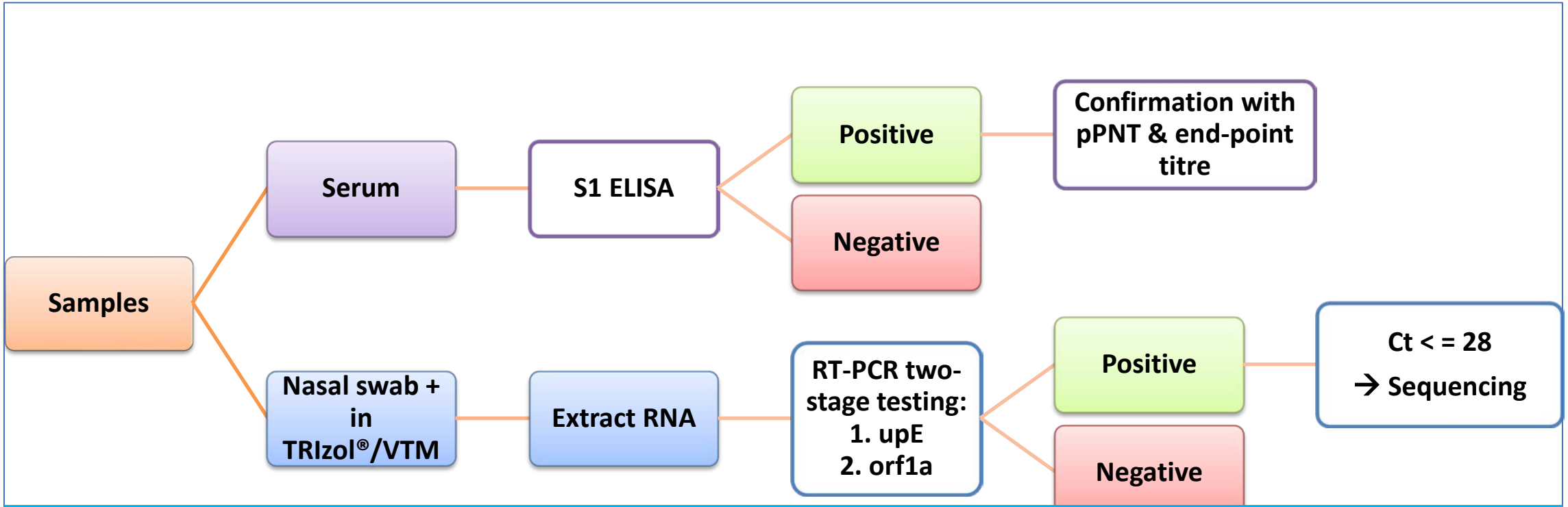
# LABORATORY ANALYSIS




Nasal swab +; Nasa swab (ante mortem), deep olfactory epithelium swab (postmortem), Nasal turbinate tissue and retropharyngeal lymph node tissue

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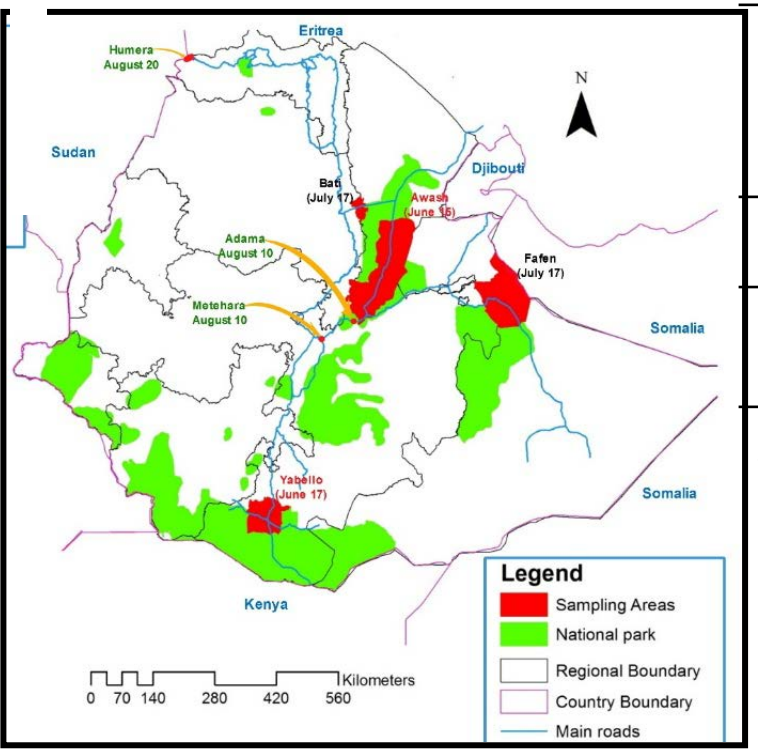
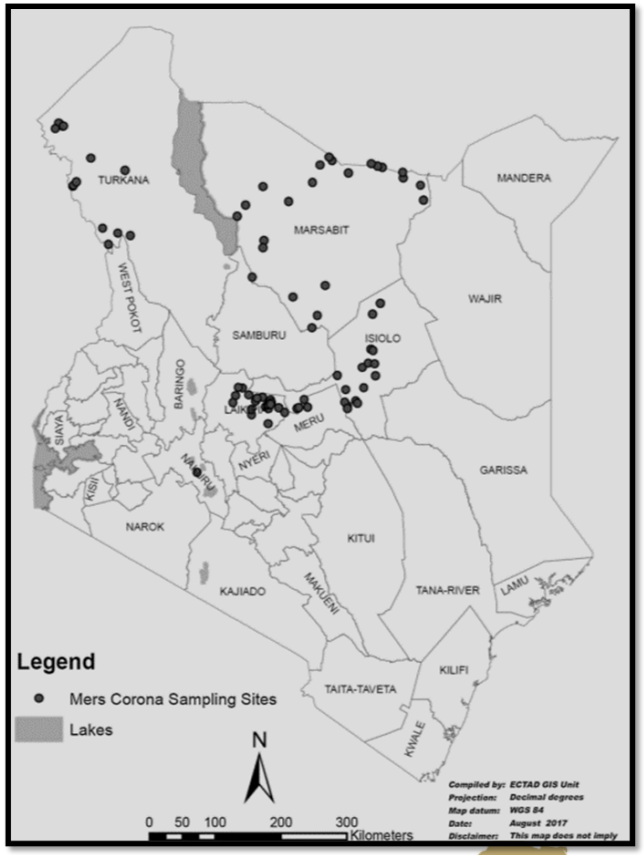
# Key findings

## Ethiopia




| | ETHIOPIA | KENYA |
|---|---|---|
| **Serology** | | |
| | X-sectional – 71%<br>(68.08, 73.50)<br>cohort – 53% | Pastoral – 68%<br>Ranched – 17% |
| **Molecular** | | |
| **Cohort study** | pending | 0% |
| **Abattoir study** | | |
| nasal swab | 18% | 2.4% |
| Olfactory epithelium swab | 0% | 54% |
| lymph node | 3.6% | 11.5% |
| Turbinate tissue | 3.6% | 48% |
| Whole genome sequencing | 5 samples<br>1 isolated | 15 samples<br>3 isolated |

## Kenya

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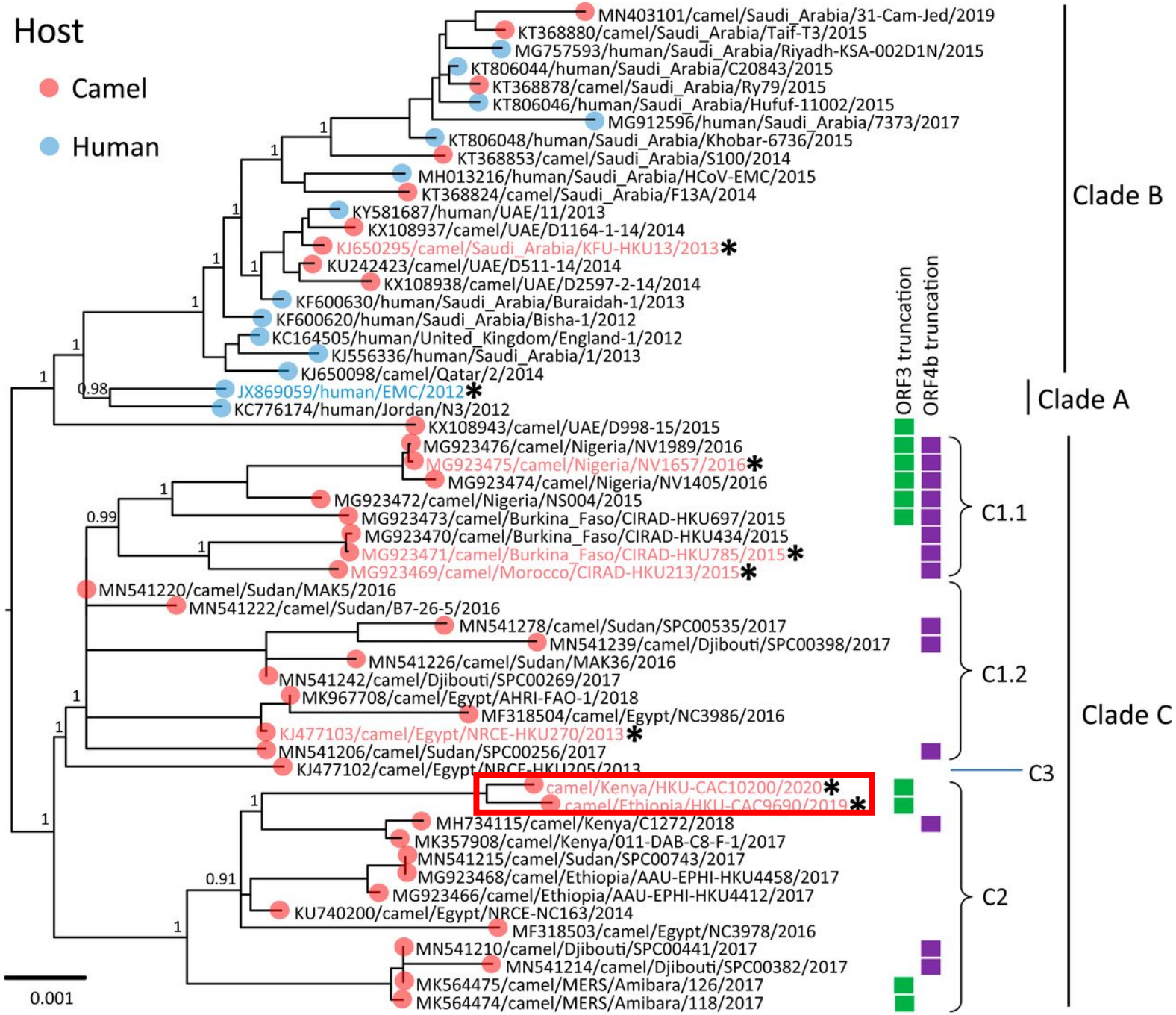
# Clade C viruses circulating in both countries

Zhou *et al*., 2021. https://doi.org/10.1073/pnas.2103984118
Kiambi *et al*., 2018. https://doi.org/10.1038/s41426-018-0193-z

- MERS viruses genetically grouped with Clade C2 found elsewhere in Africa
- Phenotypic characteristics - suggest that MERS-CoV circulating in Africa poses **lower zoonotic risk** than clades A and B - circulating in the Arabian Peninsula

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# Capacity building

## Objective 2: Improve laboratory and MERS CoV surveillance capacities

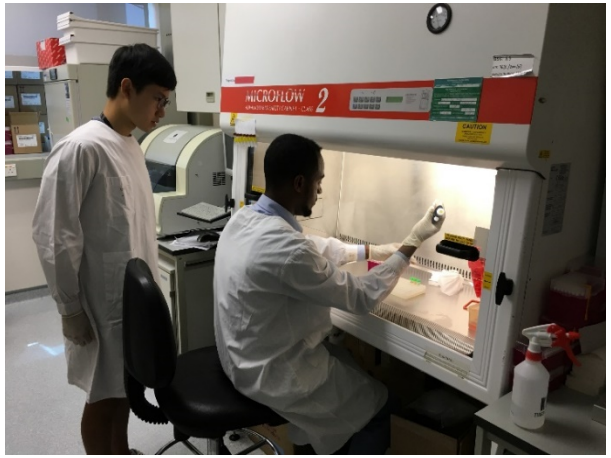
Training of staff – central referral labs (both countries)

- MERS and surveillance techniques
- Laboratory techniques – serology and advanced molecular diagnostics techniques
- Biosafety/biosecurity, handling potential hazard pathogens, sample collection, preservation, transportation and storage

Equipment

- PCR thermocycler machines
- ELISA Readers
- Luminescence Readers
- Ultralow freezers etc

Consumables, kits and reagents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# One Health

## Objective 3: Contribute to One Health Operationalization and networking

- Multi-sectoral MERS TWG established in both countries→ OH policy recommendations on risk mitigation
- Better understanding of MERS-CoV & transmission risks
- Relationships with internationally recognized MERS research labs established
- FAO-OIE-WHO tripartite recommendations → Consultative process & new country work plans
- Equipping of a new generation of work OH force – postgraduate students engagements
- Expanded the scope of OH issues with farmers on camel health & related issues including AMR

NOHSC establishment, 2019, Ethiopia



MERS-TWG, 2016, Kenya

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# Future directions

- Identifying new variants of the virus in different geographical locations
- Broadening surveillance to include other animal coronaviruses in livestock & possible recombination studies
- Applied research on risk mitigation interventions
- Institutional capacity building on surveillance for early detection of mutations and genetic recombination

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# Challenges / Questions

<u>Subclinical infections:</u>

- Incidence of infection
- Shedding interval
- Role of milk
- Reinfections

<u>Poor understanding of immunity:</u>

- Role of humoral vs. cell-mediated? Local infections? → difficult to interpret serology
- Reinfections

<u>National capacity:</u>

- Laboratory diagnostics
- Routine surveillance (e.g. for mutations, importation clades A/B)
- Planning in the case of zoonotic transmission/human outbreaks

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# THANK YOU


## Stella Kiambi

**Stella.kiambi@fao.org**

**Authors:** *Elias Walelign, Thomas Nyariki, Gijs van 't Klooster, Stella Kiambi, Rinah Sitawa, Joshua Kimutai, Fredrick Kivaria, Wilson Kuria, George Njogu, Yilma Jobre, Nega Tewolde, Getachew Gari, Charles Bebay, Sophie VonDobschuetz, Emma Gardner*



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