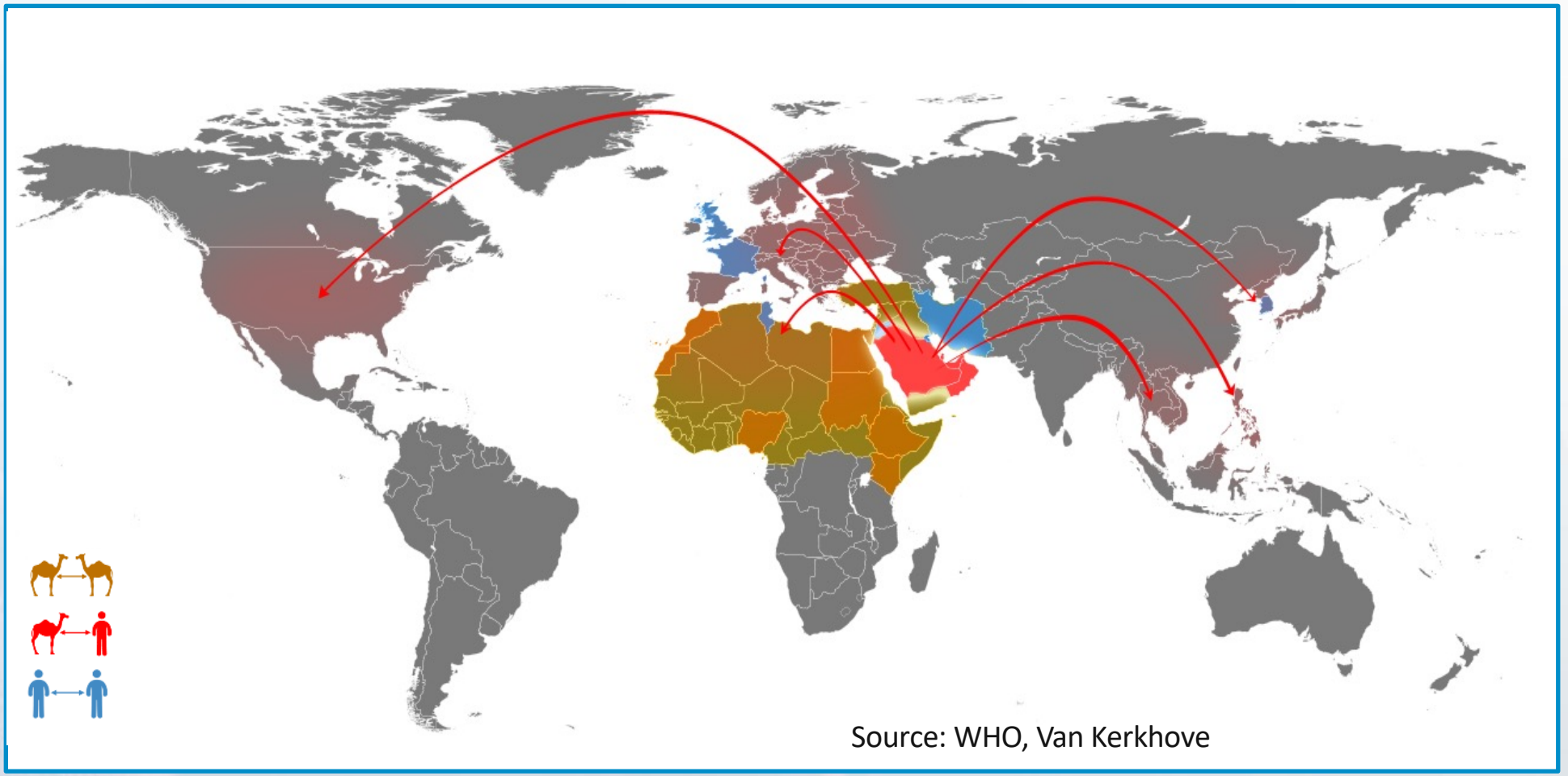
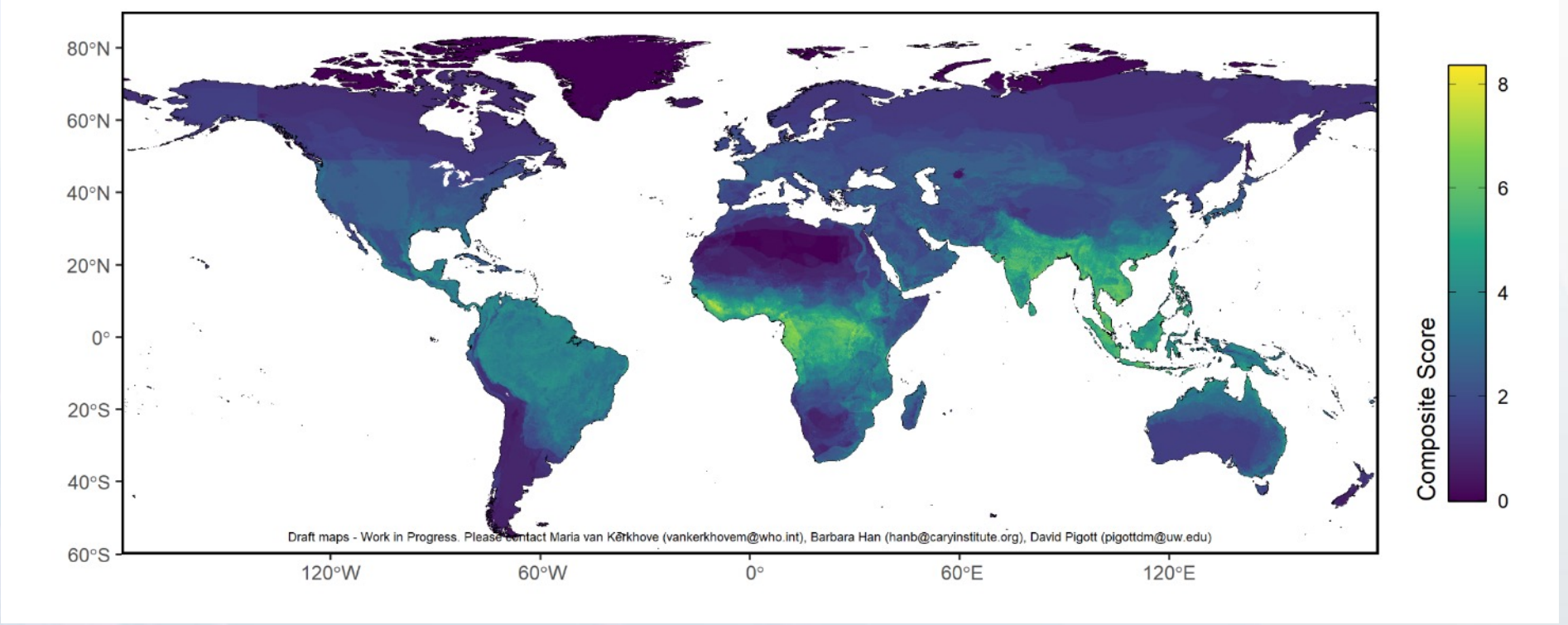
MERS-CoV – a global threat



Source: WHO, Van Kerkhove

Mapping emergence and spillover risk of pathogens with epidemic and pandemic potential

Draft maps - work in progress. Please contact Maria Van Kerkhove (vankerkhovem@who.int), Barbara Han (hanb@caryinstitute.org), David Pigott (pigottdm@uw.edu)



Pathogens included: Dengue, Chikungunya, Zika, Henipaviruses: Hendra and Nipah, Mpox, MERS-CoV, Plague, Ebola, Marburg;

Pathogens to include: HPAI, CoV SARS-CoV-2 and begacoronaviruses Lassa fever, Rift Valley Fever, and Crimean-Congo Haemorrhagic Fever

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Food and Agriculture Organization of the United Nations

UN environment programme

World Health Organization

World Organisation for Animal Health
Founded as OIE

Global priorities and available tools for Middle East respiratory syndrome coronavirus (MERS-CoV)

Sophie von Dobschuetz, WHO

Hala Abou El Naja, WHO EMRO

Emma Gardner, FAO

Gounalan Pavade, WOAH

ONE HEALTH QUADRIPARTITE COLLABORATION

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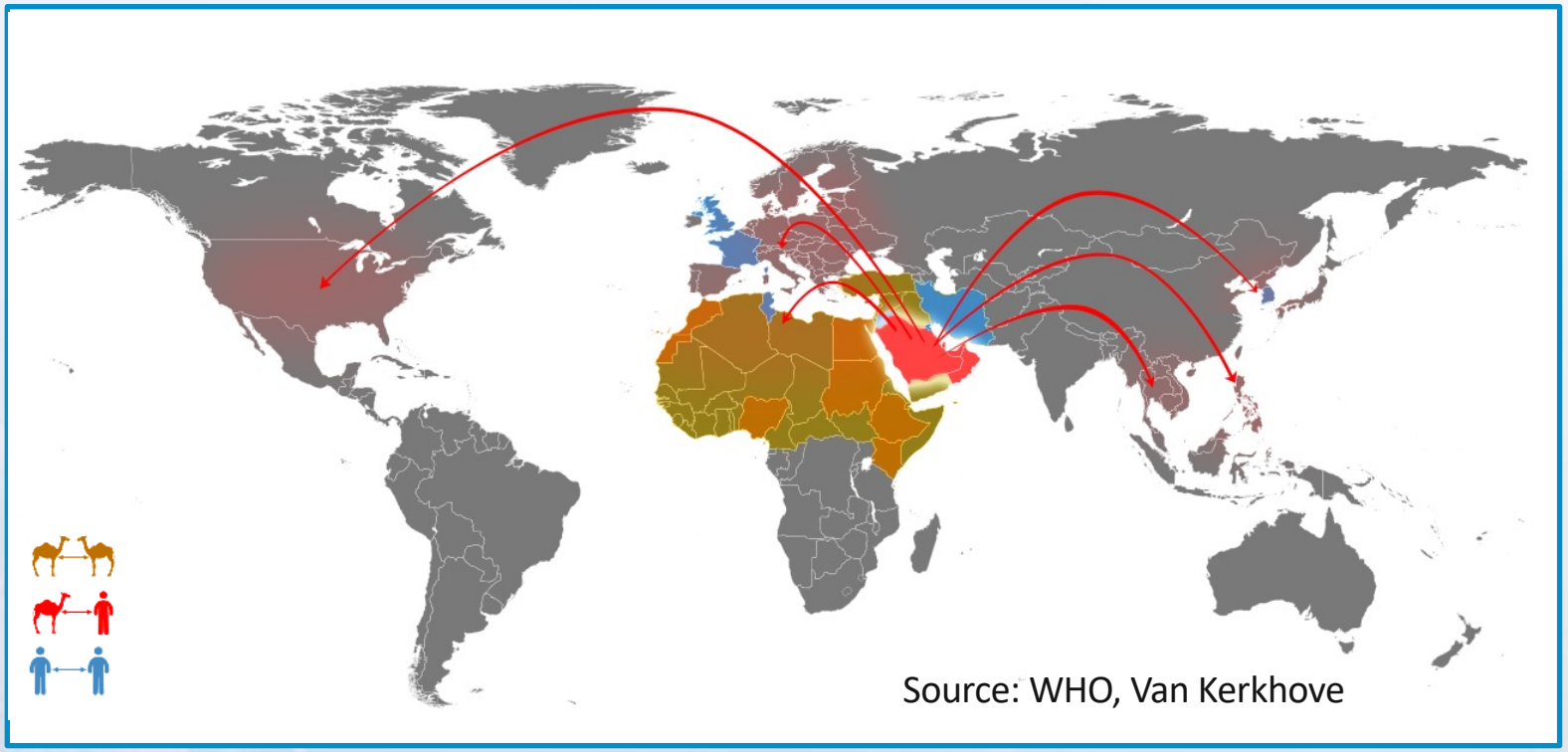
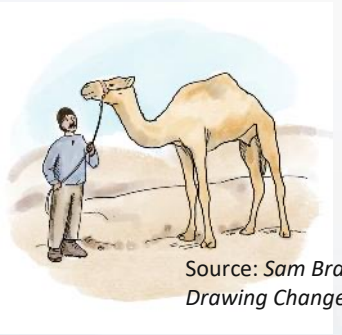
MERS-CoV – a global threat



Reservoir host:
dromedary camels



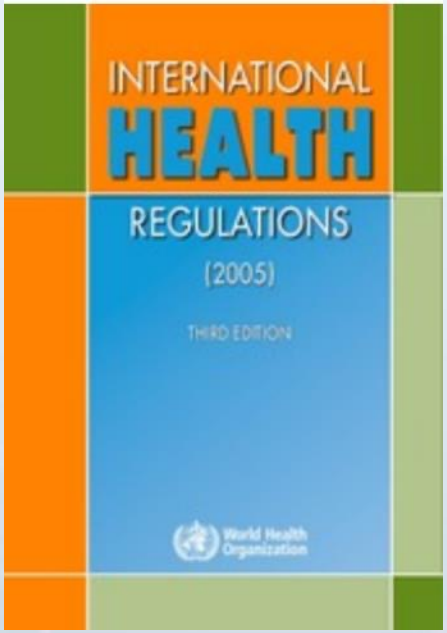
Sporadic spillover to humans

Human-to-human transmission in healthcare settings or communities

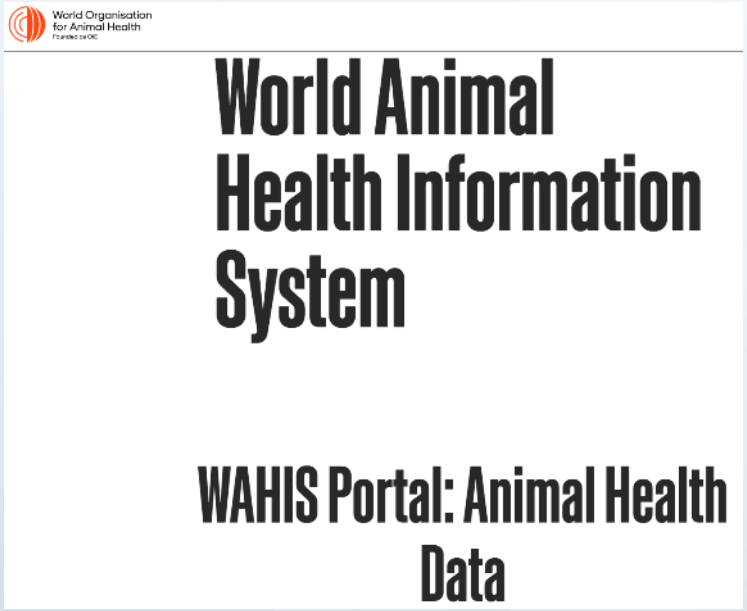
MERS-CoV is a WHO priority blueprint disease for R&D.

International regulations for the notification of MERS-CoV

For human cases: WHO IHR

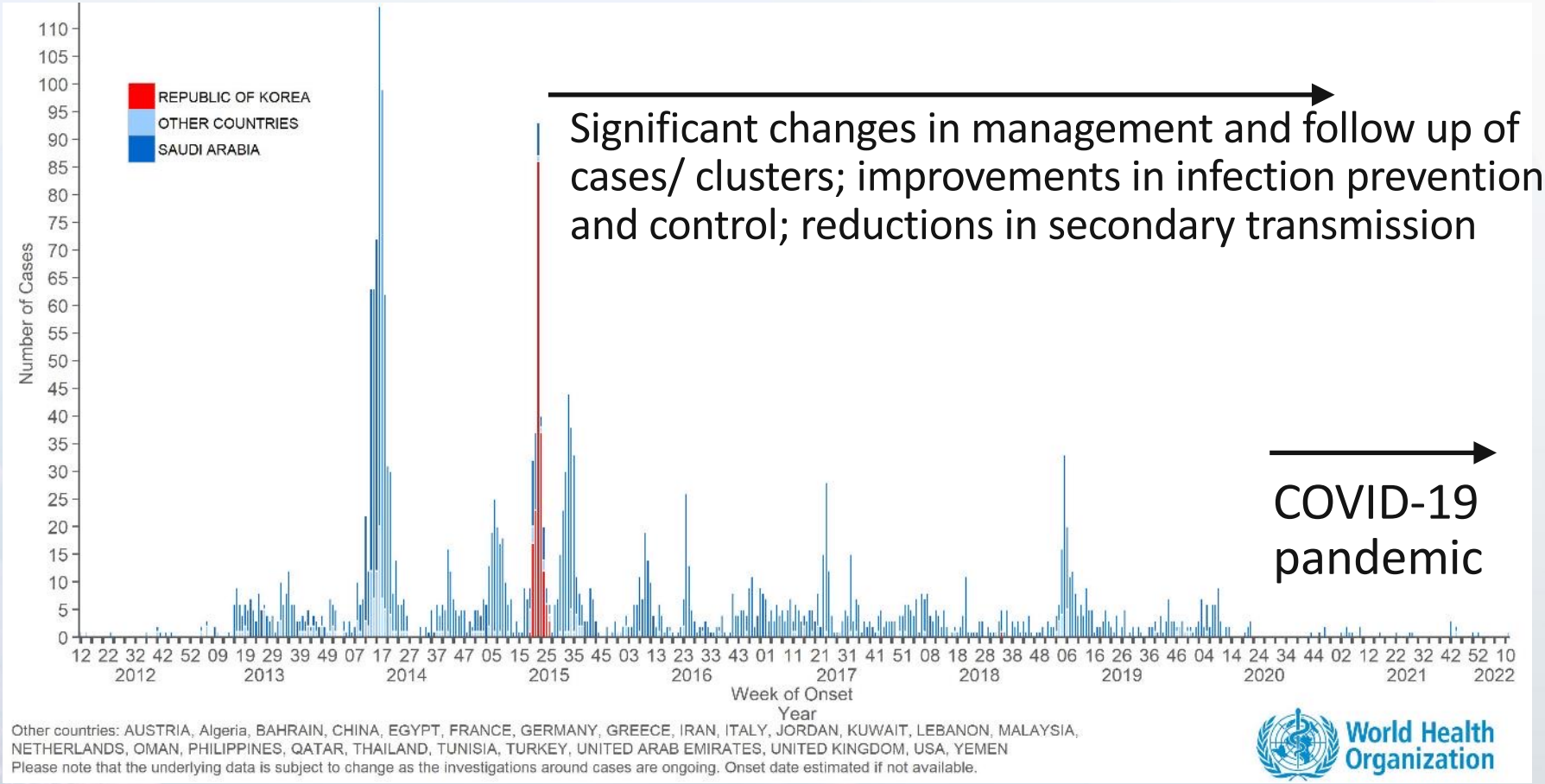


For animal cases: WOAH WAHIS



Timeline of MERS-CoV human cases

WHO MERS-CoV global epidemic curve

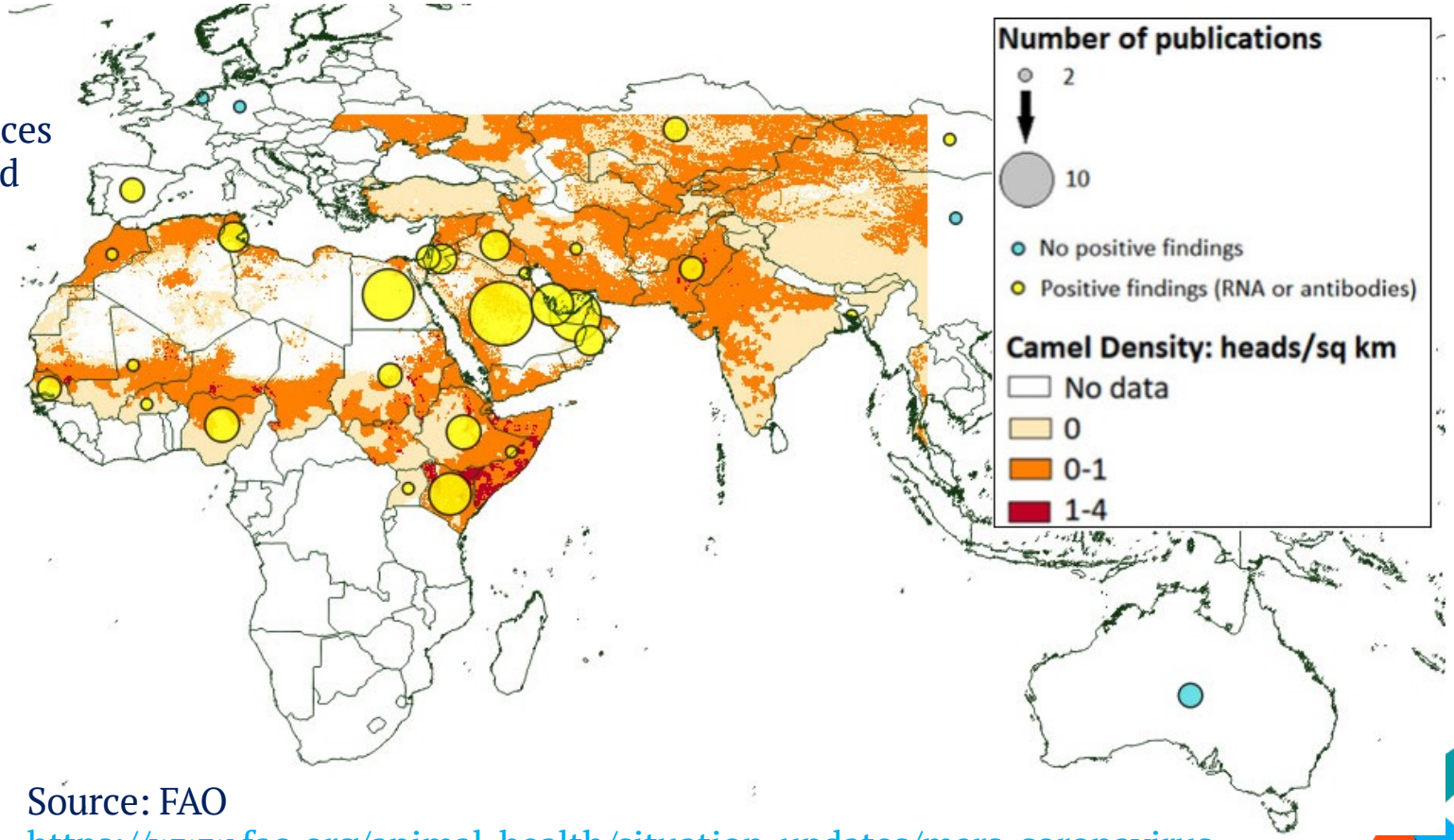


MERS-CoV field studies conducted in camels

Phylogenetic differences in MERS-CoV detected globally:

Arabian Peninsula:
Clade A (extinct)
Clade B

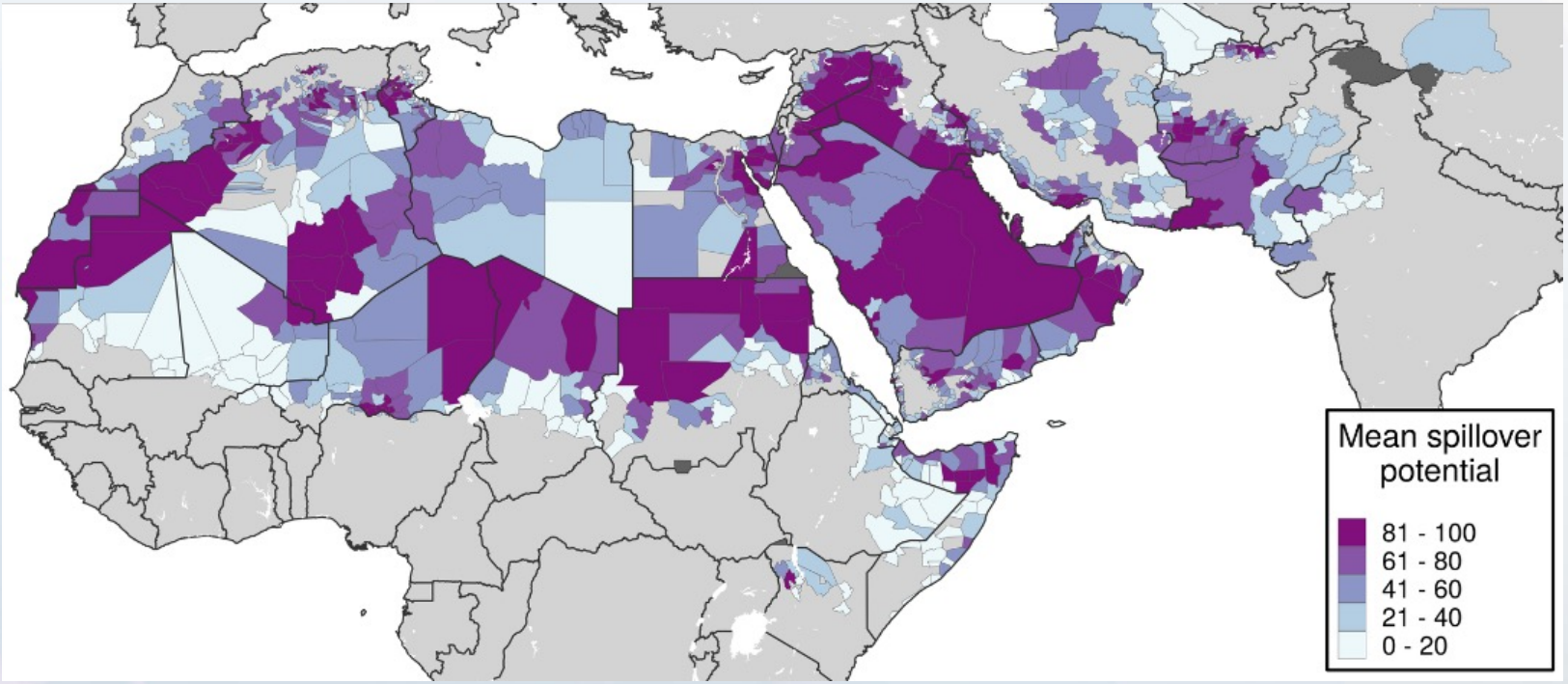
Africa:
Clade C



Source: FAO
https://www.fao.org/animal-health/situation-updates/mers-coronavirus

Risk of MERS-CoV emergence and spillover

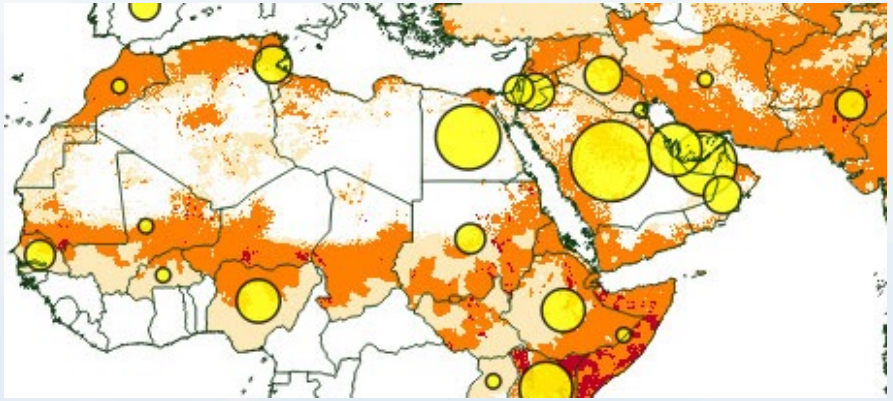
WHO / IHME MERS-CoV risk map for MERS-CoV spillover



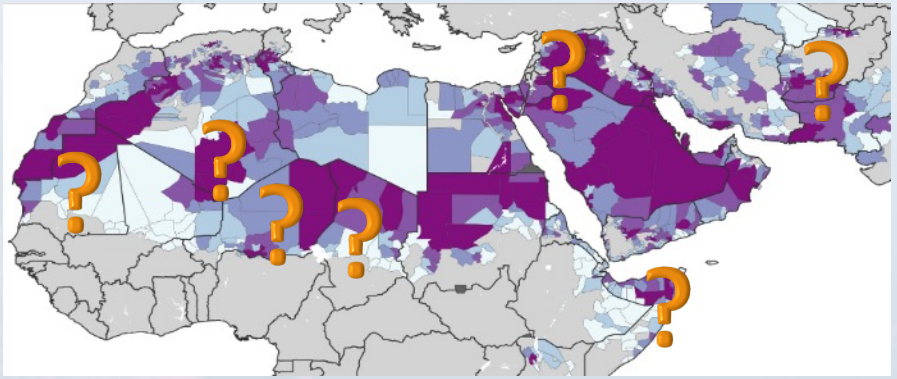
Draft maps - work in progress. Please contact Maria Van Kerkhove (vankerkhovem@who.int), Barbara Han (hanb@caryinstitute.org), David Pigott (pigottdm@uw.edu)

Geographical and temporal surveillance gaps

Countries with field studies in camels, over the camel population density



Countries at risk of MERS-CoV without studies in humans or animals



Region/Country Year	2018	2019	2020	2021	2022
Africa - Camelus dromedarius only	3	20	1		
Burkina Faso					
Egypt	1				
Ethiopia		11			
Kenya	2	9	1		
Middle East	20	5			
Jordan					
Camelus dromedarius					
Homo sapiens					
Oman					
Camelus dromedarius					
Homo sapiens					
Qatar					
Camelus dromedarius					
Homo sapiens					
Saudi Arabia	20	5			
Camelus dromedarius	8				
Homo sapiens	12	5			
United Arab Emirates					
Camelus dromedarius					
Homo sapiens					

Legend	
	camel surveillance ongoing
	confirmed human case reported

Need for representative surveillance data and sequences

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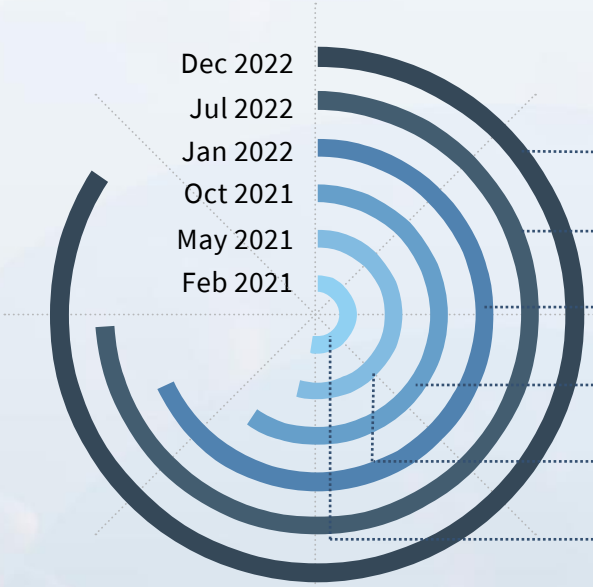
Increasing sequencing capacities worldwide



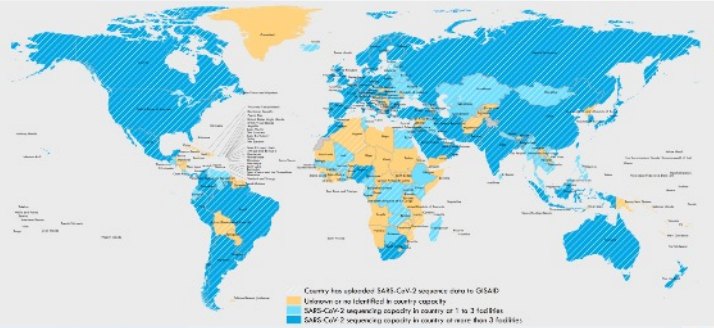
Number of Member States that have SARS-CoV-2 sequencing capability

- Dec 2022: 163 of 194
- Jul 2022: 143 of 194
- Jan 2022: 131 of 194
- Oct 2021: 115 of 194
- May 2021: 105 of 194
- Feb 2021: 103 of 194

Source: WHO genomic sequencing strategy

Global SARS-CoV-2 sequencing capacity

Data as of 3 March 2021



Maintaining and sustaining capacities

Utilizing capacities for other pathogens, like MERS-CoV

Building bioinformatic capacities

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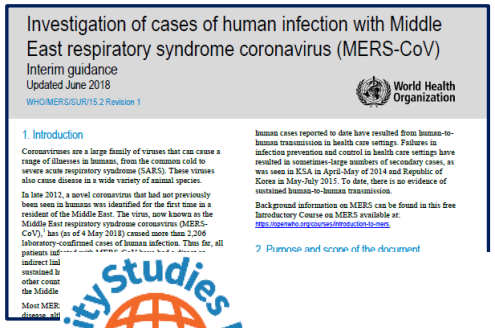
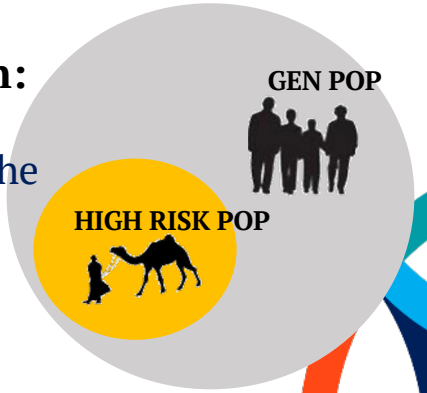
Available tools – surveillance in humans and camels



1. **WHO surveillance protocols/interim guidance updated:**
   - Based on lessons learned from COVID-19
   - Make look-and-feel similar to existing UNITY protocols

2. **FAO camel sampling guidance**
   - To ensure good quality samples
   - For optimized MERS-CoV detection, isolation and genetic characterization

3. **Quadripartite collaboration:**
   - Study protocols for risk factor identification, generally and at the animal-human interface
   - Anthropological questionnaires



Available tools – WOAH Terrestrial Manual chapter on MERS-CoV

- Chapter 3.5.2. Middle East Respiratory Syndrome (Infection of dromedary camels with MERS-CoV) https://www.woah.org/fileadmin/Home/eng/Health_standards/tahm/3.05.02_MERS-CoV.pdf
- Provides test methods available for diagnosis of MERS and their purposes
- Updates on vaccines

Method	Purpose					
	Population freedom from infection	Individual animal freedom from infection prior to movement	Contribute to eradication policies	Confirmation of clinical cases	Prevalence of infection – surveillance	Immune status in individual animals or populations post-vaccination
Detection of the agent						
Real-time RT-PCR	–	+++	+	+++	+++	–
Antigen detection	–	+	+	++	++	–
Virus isolation and identification	–	+	–	+++	–	–
Detection of immune response						
Indirect IgG ELISAs	++	–	++	–	++	+
Pseudo-particle neutralisation assay	+	–	+	–	+	+++
PRNT	+	–	+	–	+	+++
VNT	+	–	+	–	+	+++

Key: +++ = recommended for this purpose; ++ = recommended but has limitations;
+ = suitable in very limited circumstances; – = not appropriate for this purpose.
RT-PCR = reverse-transcription polymerase chain reaction; IgG ELISA = immunoglobulin G enzyme-linked immunosorbent assay; PRNT = plaque reduction neutralisation test; VN = virus neutralisation.

MERS-CoV multicountry outbreak simulation exercise

Workshop at EMARIS, 14. March 2023, Muscat, Oman

Objectives:

- Identify the key stakeholders, roles and responsibilities within a multisectoral or One Health coordination mechanism
- Identify major steps to be adopted at country level for the preparedness, investigation of and response to zoonotic diseases under the One Health umbrella
- Learn from countries' experiences about successes and challenges in implementing multi-sectoral prevention and control activities for zoonotic diseases like MERS
- Discuss the optimal multisectoral coordination and communication mechanisms

This will be turned into a fully-fledged regional simulation exercise (stay tuned)

Global collaboration on MERS

Tripartite workplan on MERS

- Field surveys in humans and animals
- Anthropological studies
- Knowledge, Attitudes and Practices (KAP) studies

Regular inter-agency coordination calls

Keeping the research agenda up to date

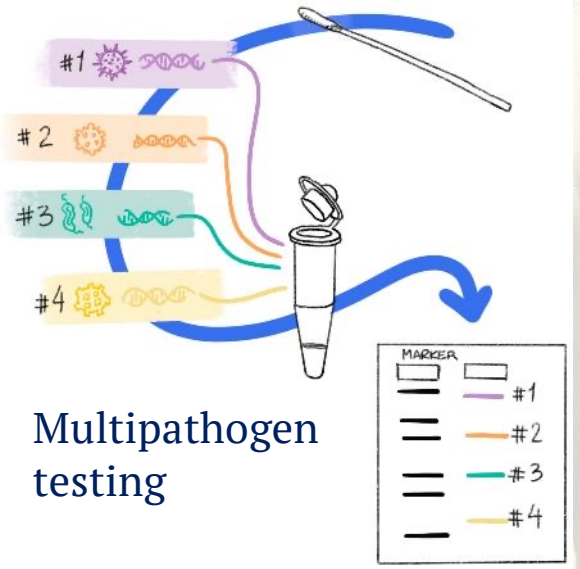
Global technical meetings:

- December 2017 – WHO HQ Geneva, Switzerland
- November 2021– virtual
- **Planned for 27-29 November 2023** – Kingdom of Saudi Arabia

Global priorities for MERS-CoV

Outputs/recommendations from TPT MERS meeting

- Increase surveillance:
  - Humans and camels
  - Middle East and Africa
- Integrated surveillance for respiratory pathogens to include MERS-CoV
- One Health interventions to reduce zoonotic risk
- Feasibility and acceptability of camel vaccines
- Scientific and collaborative achievements from COVID pandemic leveraged
- OH data sharing mechanisms, tested in peace time



Multipathogen testing

Source: *Sam Bradd, Drawing Change*

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Thank you