



# Global Health Security Program

*From the global to the local*

## **BIORISK MANAGEMENT IN A ONE HEALTH WORLD**

**USDA ARS 3<sup>RD</sup> INTERNATIONAL BIOSAFETY & BIOCONTAINMENT SYMPOSIUM**

**5 FEBRUARY 2015**

**JULIE E. FISCHER**

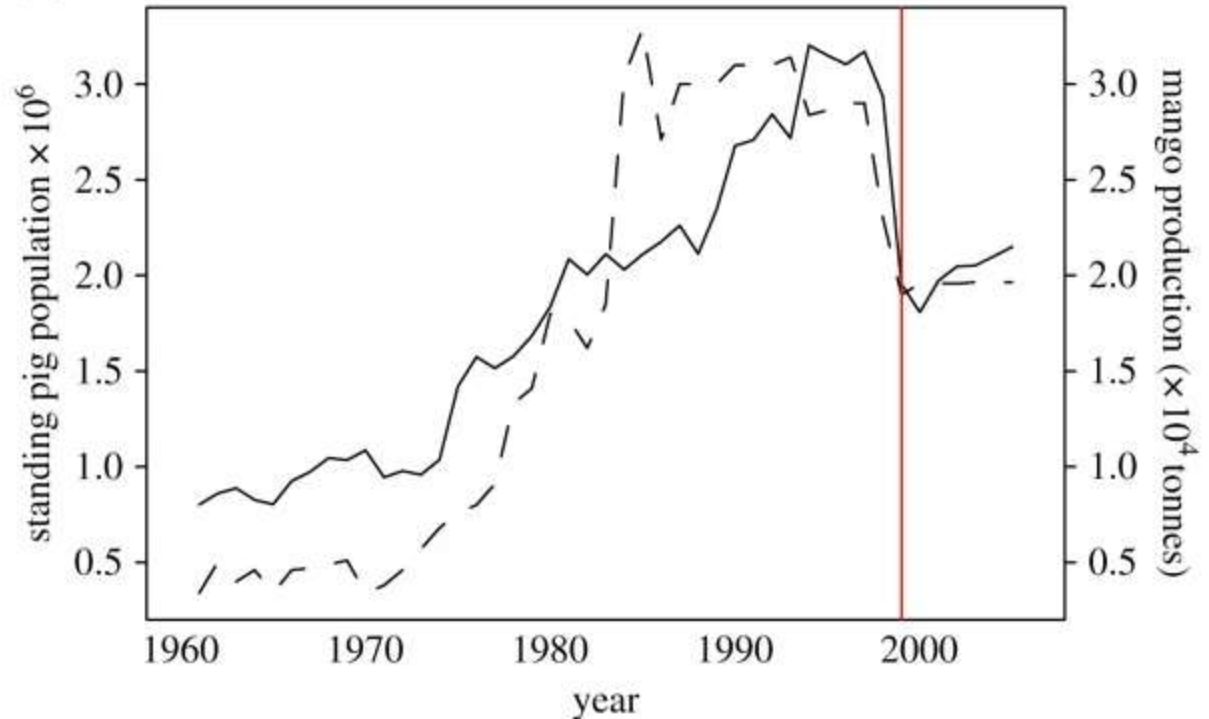
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WASHINGTON  
UNIVERSITY  
WASHINGTON, DC

# Malaysia (1998)



JR Pulliam, et al. *J Royal Society Interface* 2012; 9(66):89-101.

Sept

Oct-Nov

Feb

March

April -

- Severe febrile encephalitis cases reported among pig farmers in Perak
- Investigation notes respiratory disease in pigs

- Intensive JEV control measures

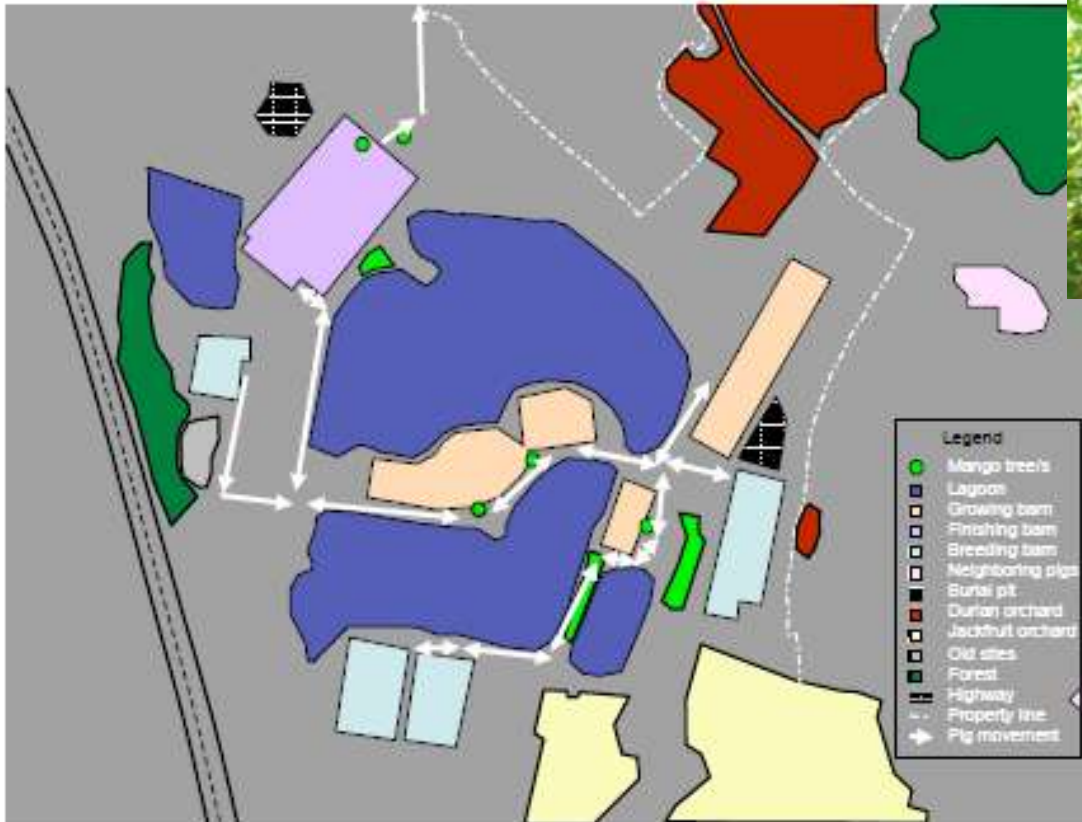
- Human and pig disease cases recognized in other parts of Malaysia

- 11 cases of respiratory and encephalitis illnesses in Singapore abattoir workers
- Novel virus confirmed
- Cabinet Task Force Committee chaired by DG-Health
- 24/7 National Operations Room at MOH

- Culling of >1 million pigs



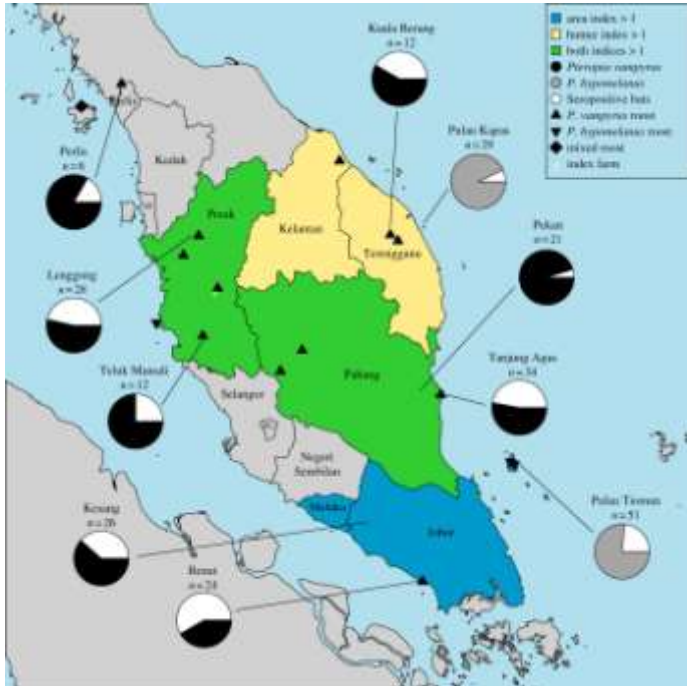
265 cases  
105 deaths



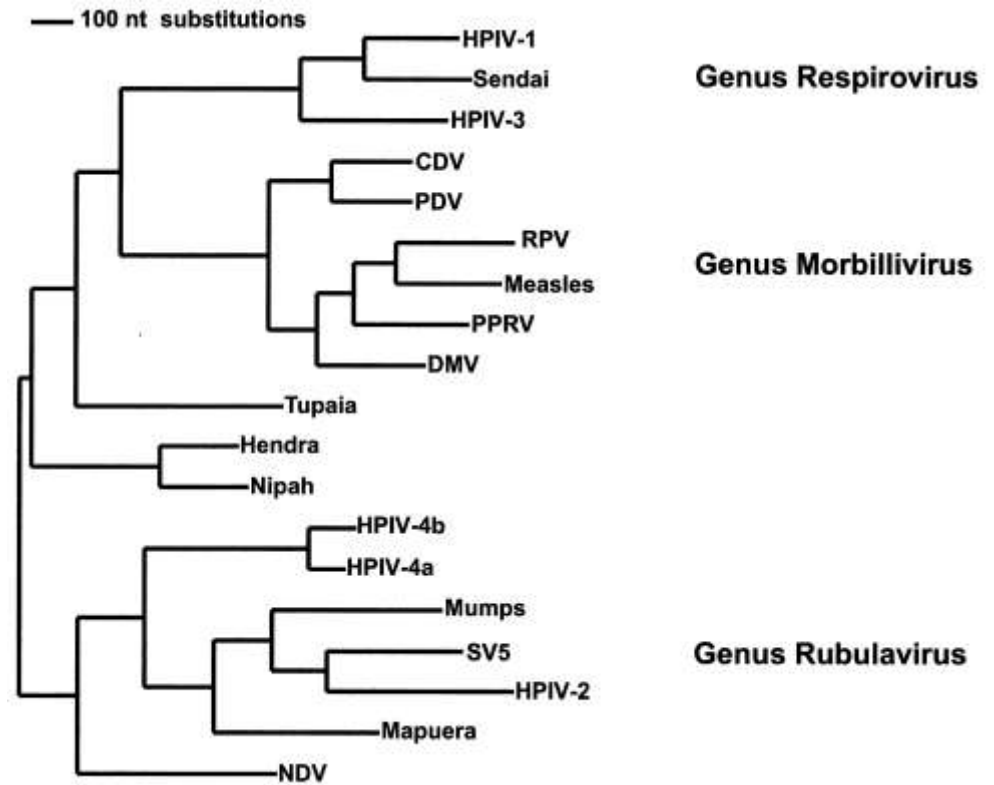
*Pteropus hypomelanus*  
Photo: Jean (2007)

JR Pulliam, et al. *J Royal Society Interface* 2012; 9(66):89-101.



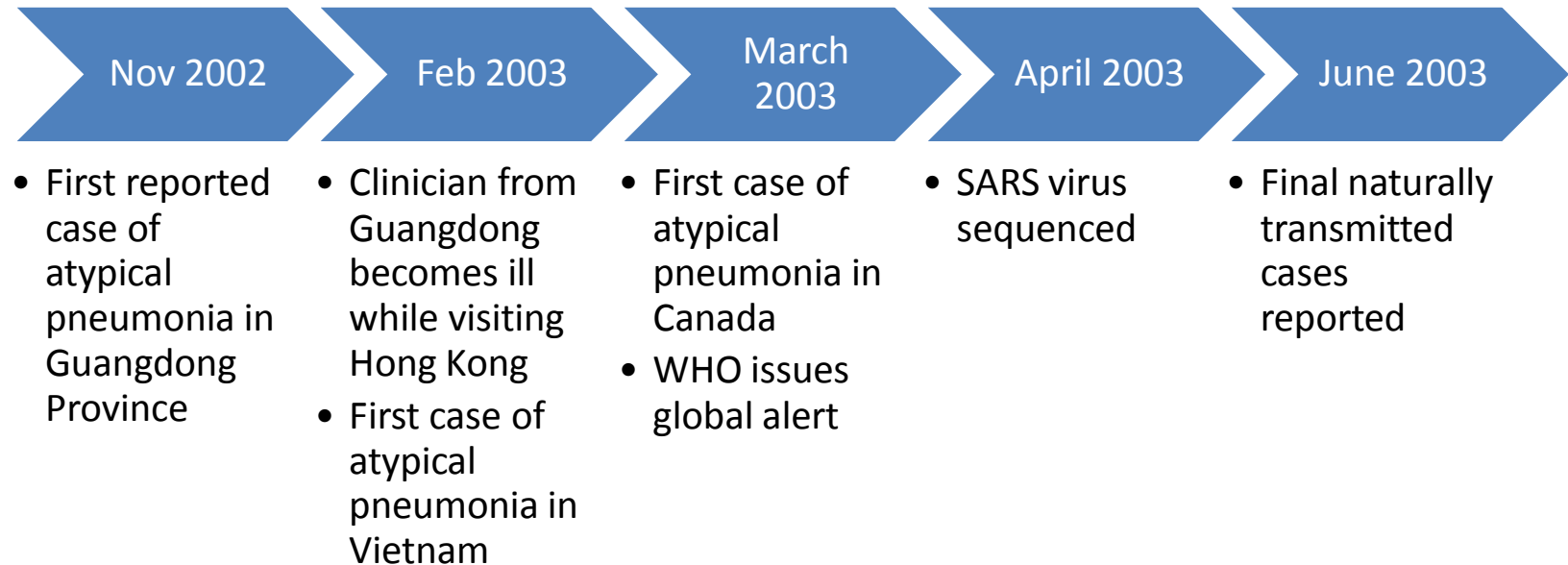


JR Pulliam, et al. *J Royal Society Interface* 2012; 9(66):89-101.

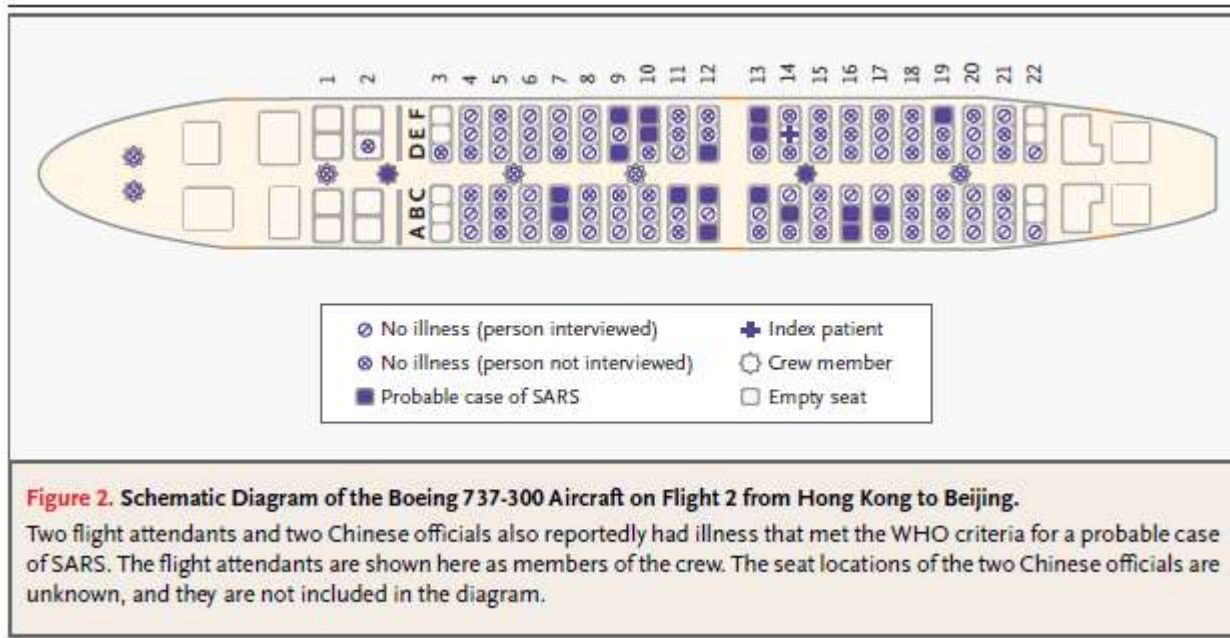


K B Chua et al. *Science* 2000;288:1432-1435

# China/Hong Kong (2002-3)





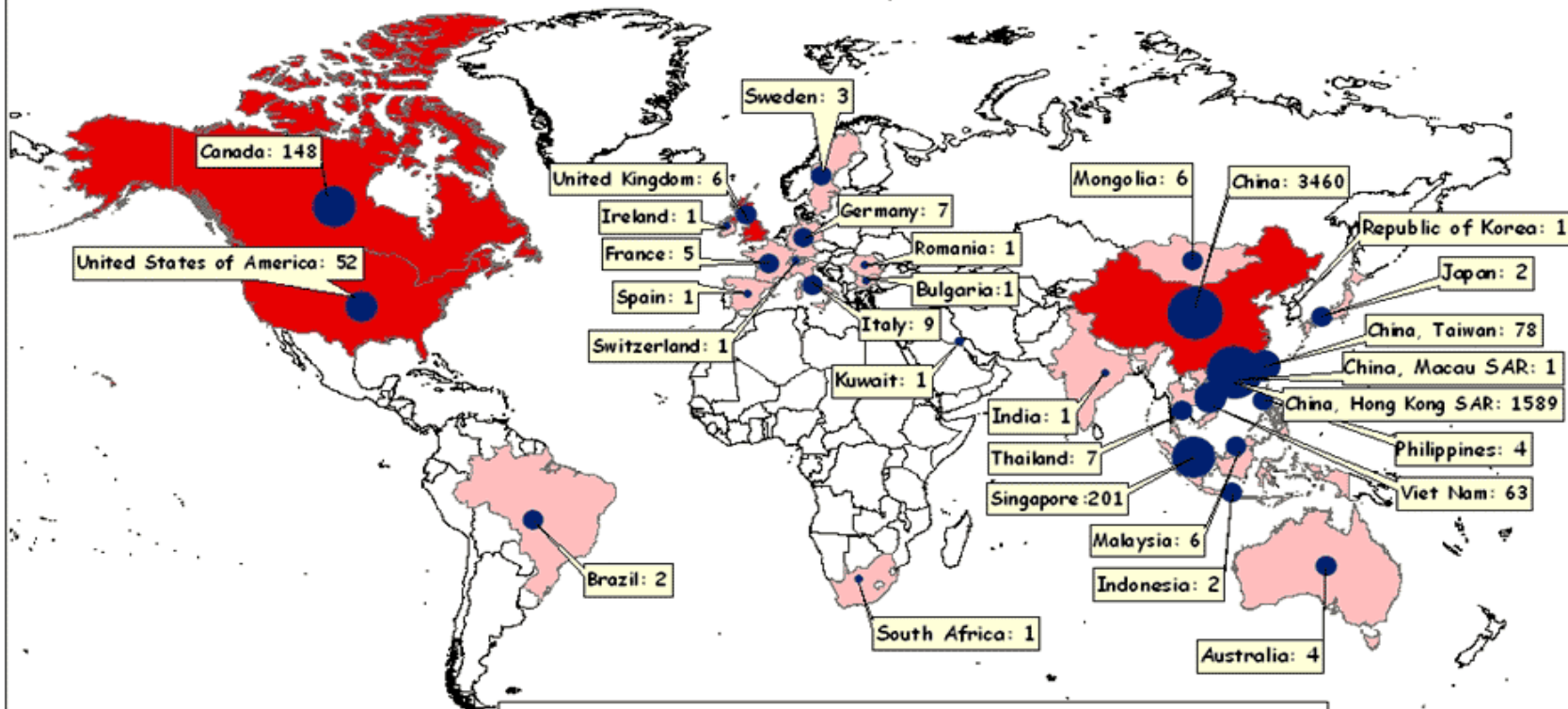


SJ Olsen et al., *N Engl J Med* 2003; 349:2416-22.




# SARS : Cumulative Number of Reported Probable Cases

Total number of cases: 5663 as of 30 April 2003, 17:00 GMT+2



Cumulative number of Reported Cases (From 1 November 02 to 30 April 03)		Type of transmission	
•	1	●	101 - 1000
●	2 - 10	●	> 1000
●	11 - 100	■	no local transmission
		■	local transmission

 The presentation of material on the maps contained herein does not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or areas or of its authorities, or concerning the delimitation of its frontiers or boundaries.

Data Source: World Health Organization  
 Map Production: Public Health Mapping Team  
 Communicable Diseases (CDS)  
 ©World Health Organization, April 2003

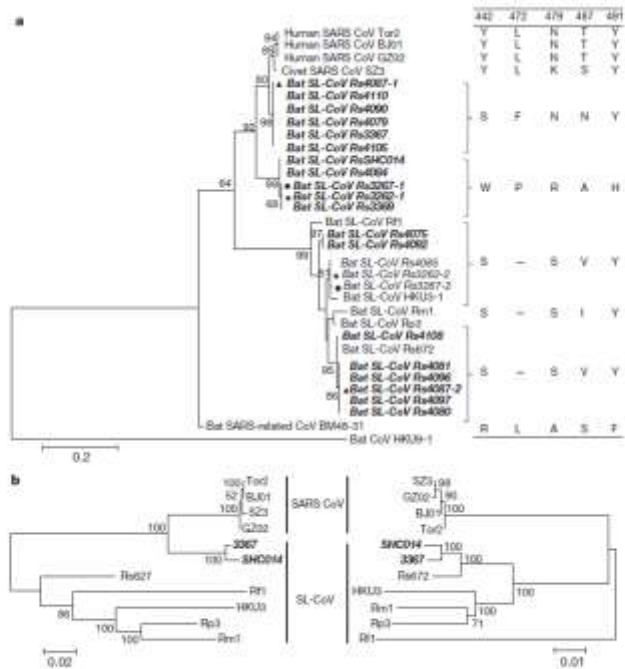
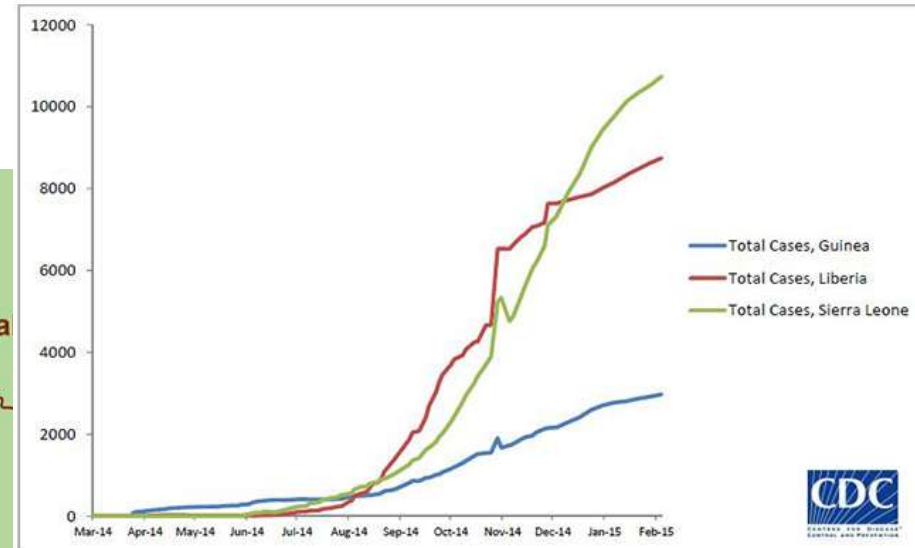
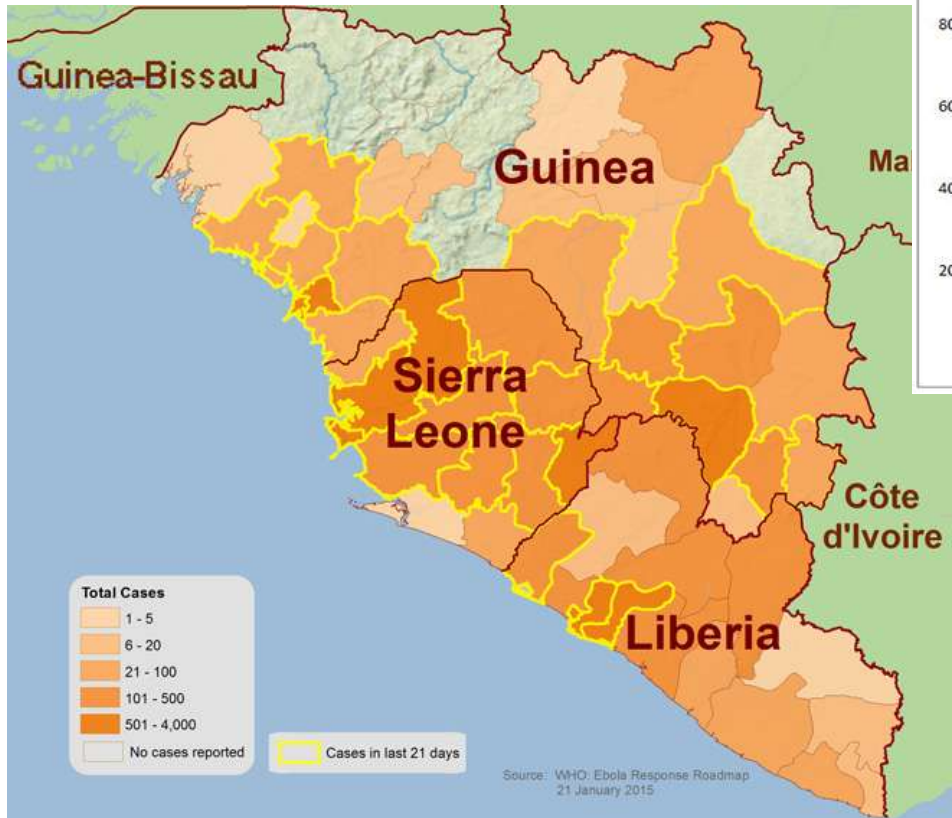


Figure 1 | Phylogenetic tree based on amino acid sequences of the 5 RBD region and the two parental regions of bat SL-CoV Rn3367 or RnSHC014. a SARS-CoV & *R. macrotis* amino acid residues 316-530 were aligned with *R. ferrugineus* and *R. macrotis*, respectively, collected in Hubei, China, in 2004. Bat SARS-related CoV BM48-31 was identified from *R. Maci* collected in Bulgaria in 2008. Bat CoV HKU33-1 was identified from *Rousettus leucorhinus*.

XY Ge et al. *Nature* 2013; 503: 535–538.

# Coda: laboratory-acquired SARS (2004)

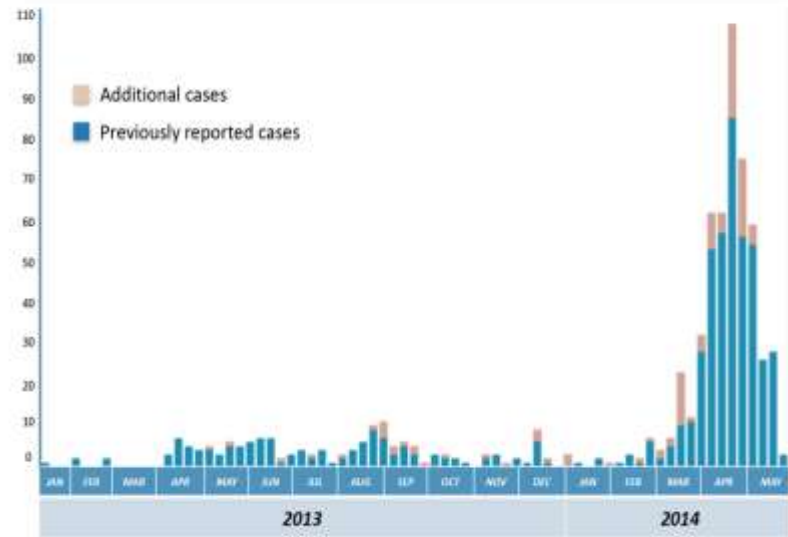




<http://www.cdc.gov/vhf/ebola/outbreaks/2014-west-africa/index.html>

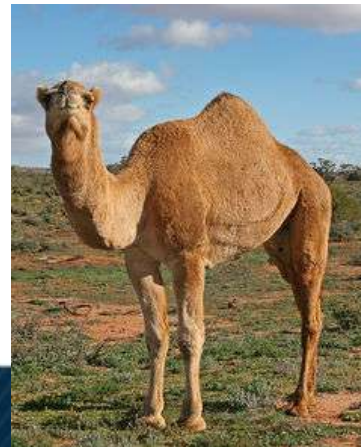


Distribution of MERS CoV infections by date of onset and time of reporting, Saudi Arabia, 2013–2014, by week

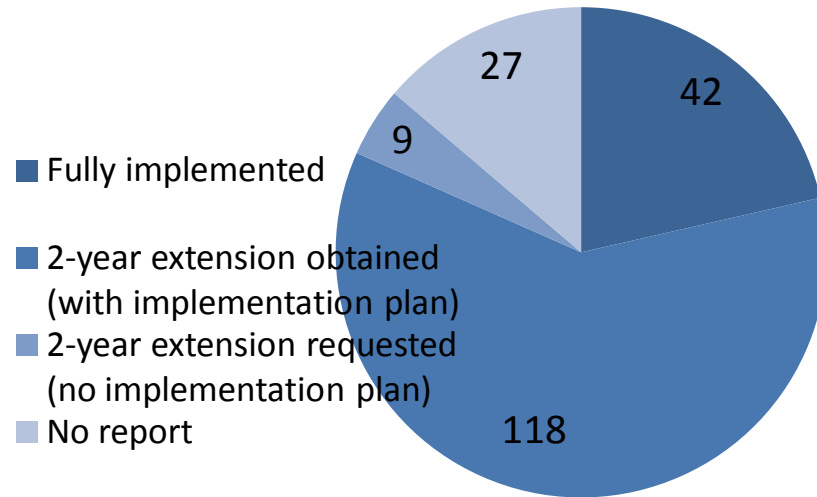


Source: Ministry of Health Saudi Arabia

Distribution of confirmed cases of MERS-CoV by reporting country and place of probable infection, March 2012 - 04 June 2014 (n=815)

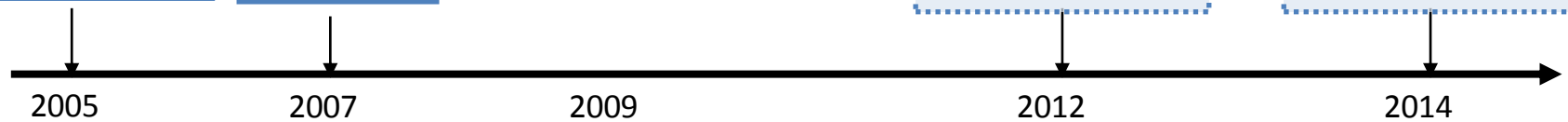






Adopted by 194 States Parties

Entered into force



States report meeting all core capacity requirements

States report meeting all core capacity requirements

OR

OR

Request extension

Request 2nd extension

States assess core capacities

Plan/implement capacity building

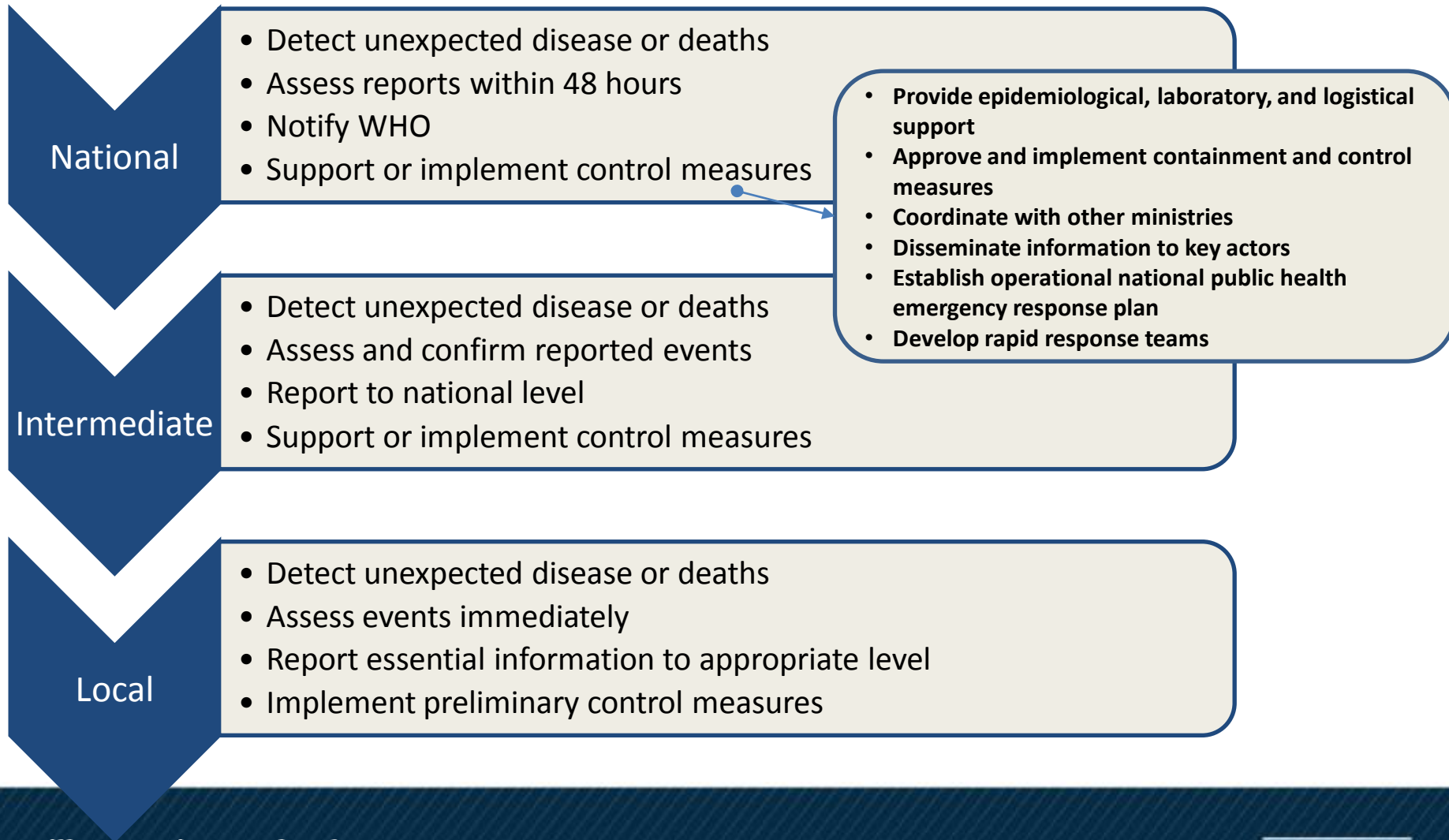
# What did States Parties agree to do?

(Articles 4, 5, 13, 44 and Annex 1)



- Communications
  - Designate a National IHR Focal Point
- Core Capacities
  - Meet minimum requirements to detect, assess, report, and respond to public health events
- Points of Entry
  - Support disease detection and control at designated ports and borders
- Notification
  - Develop a framework for notifying WHO within 24 hours of a potential PHEIC
- Minimal interference
  - Take evidence-based actions sensitive to impact on trade, travel, and human rights
- Evaluate status
  - Conduct self-assessments and report to WHO

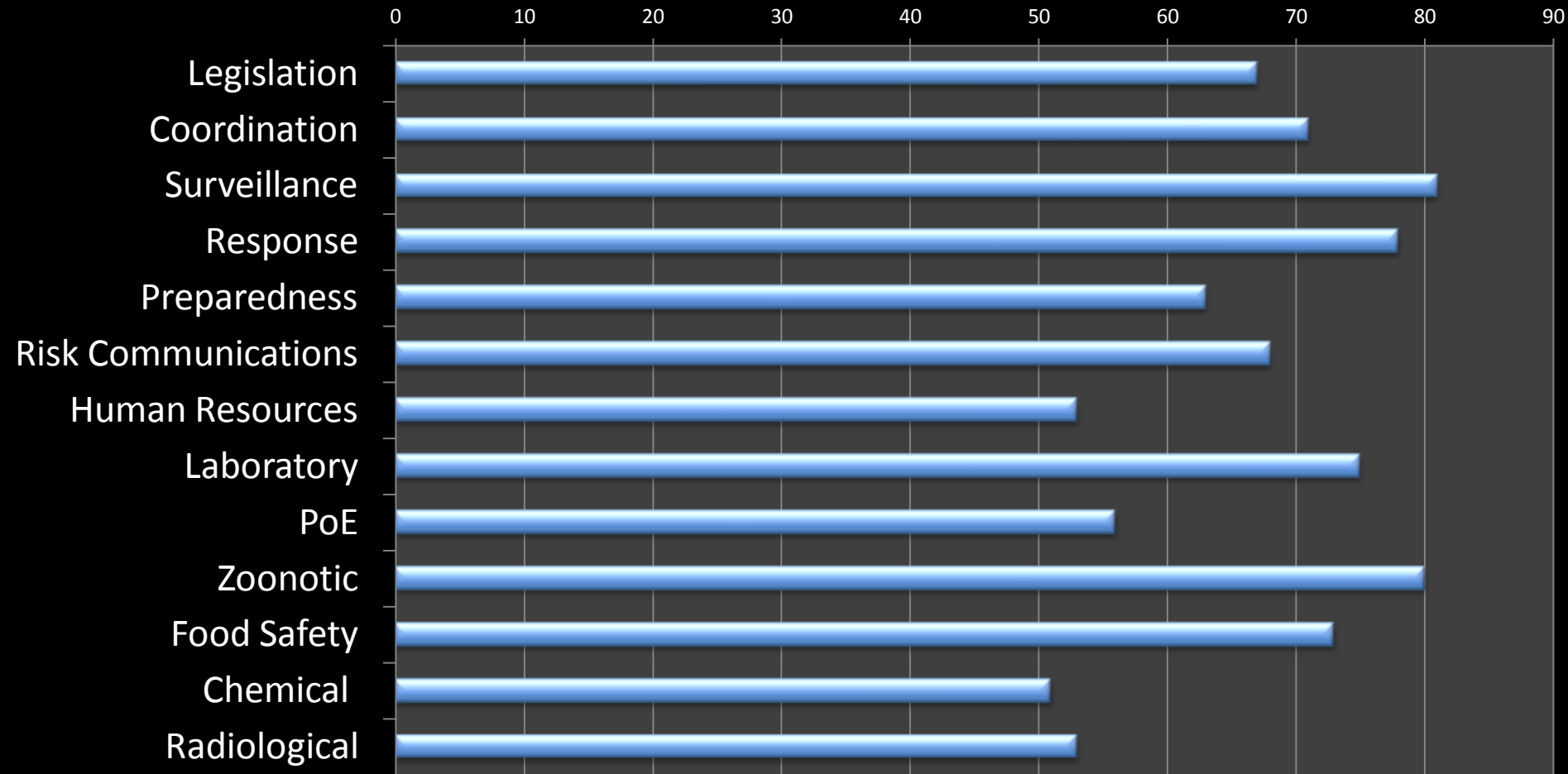
# Annex 1 defines IHR (2005) core capacity requirements





# Country Reports on IHR Implementation - 2012

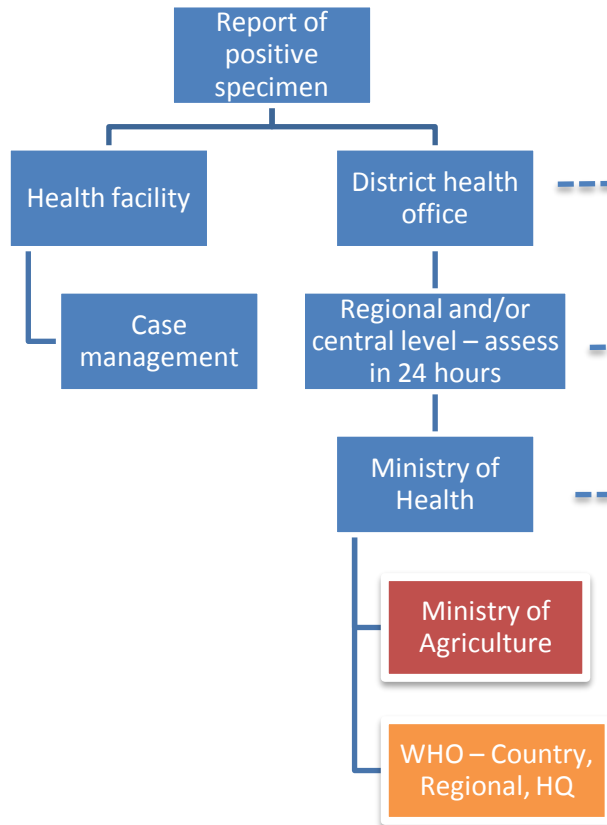
## Aggregate Score (%)



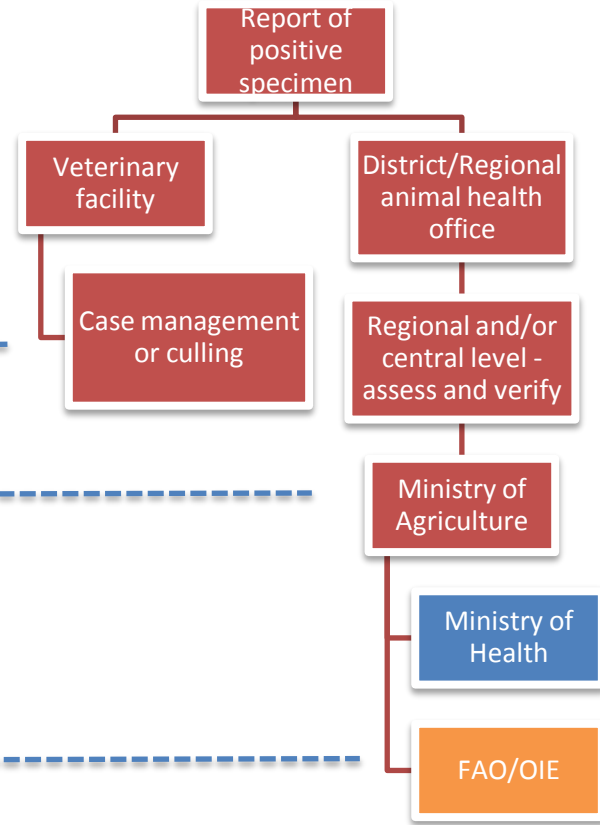




# Human



# Animal



# ACTION PACKAGES - PREVENT AVOIDABLE EPIDEMICS

1	Develop an integrated and global package of activities to combat antimicrobial resistance.	Leading : Canada, Germany, Netherlands, Sweden, United Kingdom Contributing: Australia, India, Indonesia, Italy, Japan, Norway, Portugal, Switzerland, Thailand, United States IOs: FAO, OIE, WHO
2	Adopt behaviors, policies and/or practices that minimize the spillover of zoonotic diseases from lower animals into human populations.	Leading: Indonesia, Vietnam Contributing: Georgia, Kenya, Sweden, United Kingdom, United States, Yemen IOs: FAO, OIE, WHO
3	A whole-of-government national biosafety and biosecurity system is in place.	Leading: Canada, Denmark, Kenya, Peru, Portugal, Spain Contributing: Azerbaijan, Germany, India (TBC), Jordan, Republic of Korea, United Kingdom, United States IOs: FAO, IAEA, INTERPOL, OIE, WHO
4	A functioning national vaccine delivery is in place.	Leading: Italy, Portugal Contributing: India, Pakistan, Republic of Korea, Saudi Arabia, United Arab Emirates, Yemen IOs: FAO, OIE, WHO

# ACTION PACKAGES – DETECT THREATS EARLY

1	Real-time biosurveillance with a national laboratory system and effective modern point-of-care and laboratory-based diagnostics.	Leading: South Africa, Thailand, US Contributing: Canada, China, Ethiopia, Finland, Georgia, Israel, Japan, Malaysia, Mexico, Peru, Switzerland, United Kingdom, Yemen IOs: FAO, OIE, WHO
2/3	Strengthen foundational indicator- and event-based surveillance systems that are able to detect events of significance for public health, animal health and health security.	Leading: Georgia, Norway Contributing: Azerbaijan, Ethiopia, Finland, Indonesia, Israel, Italy, Kenya, Mexico, United Kingdom, United States, Yemen IOs: FAO, OIE, WHO
4	Timely and accurate disease reporting according to WHO requirements and consistent coordination with FAO and OIE.	Leading: France Contributing: Israel IOs: FAO, OIE, WHO
5	A workforce (physicians, veterinarians, biostatisticians, laboratory scientists, farming/livestock professionals, and field epidemiologists) who can systematically cooperate to meet relevant IHR and PVS core competencies.	Leading: Jordan, Thailand Contributing: Ethiopia, Finland, Saudi Arabia, United States, Yemen IOs: FAO, OIE, WHO

# ACTION PACKAGES – RESPOND RAPIDLY & EFFECTIVELY

1	Every country will have a public health Emergency Operations Center (EOC) functioning according to minimum common standards.	Leading: Malaysia, Turkey Contributing: Ethiopia, Kenya, Saudi Arabia, United Kingdom, Vietnam IOs: FAO, OIE, WHO
2	In the event of a biological event of suspected or confirmed deliberate origin, a country will be able to conduct a rapid, multi-sectoral response, including the capacity to link public health and law enforcement, and to provide and/or request effective and timely international assistance, including to investigate alleged use events.	Leading: Republic of Korea, Peru Contributing: Australia, Canada, Indonesia, Israel, Malaysia, Portugal, United Kingdom IOs: FAO, INTERPOL, OIE, WHO
3	A national framework for transferring (sending and receiving) medical countermeasures and public health and medical personnel among international partners during public health emergencies.	Leading: Chile Contributing: Canada, Israel IOs: FAO, OIE, WHO



# Example: Biosafety/Biosecurity Action Package

## Five-Year Action Items:

- Develop and implement a strategic plan for biosafety and biosecurity.
- Develop, modernize, enact, and sustain country-specific legislation to support a national program.
- Develop, implement, and sustain a national oversight program for pathogen biosafety and biosecurity that will incorporate biological risk evaluations of the nation's biological entities; the creation of a legal framework and legal authorities; a multi-sectoral approach; the design and construction of the oversight program; the assessment and establishment of best practices to be put in place in laboratories and facilities; the training of national officials on biological risk evaluation; and existing security arrangements.
- Establish a new (or mandate an existing) government agency to administer and enforce biosafety and biosecurity oversight systems; creation of the country's list of agents of concern; and development of best practices, information material and tools for government and other entities. Activities should be conducted to ensure that agents are identified, licensed, transported, secured, monitored, and disposed of in a minimum number of facilities with biosafety and biosecurity best practices in place.
- Integrate field investigation and emergency response capability as an important part of the national program.

**Number of countries that have completed/Completion of a national framework and comprehensive oversight system for pathogen biosafety and biosecurity, strain collections, containment laboratories and monitoring systems that includes identification and storage of national strain collections in a minimal number of facilities.**

**PREVENT - GHSA Objective 2**

**GHSA Action Package Prevent 3: Biosafety and Biosecurity**

**GHSA 5-Year National Target**

A whole-of-government national biosafety and biosecurity system is in place, ensuring that especially dangerous pathogens are identified, held, secured and monitored in a minimal number of facilities according to best practices; biological risk management training and educational outreach are conducted to promote a shared culture of responsibility, reduce dual-use biological risks, and ensure safe transfer of biological agents; and country-specific biosecurity legislation, laboratory licensing, and pathogen control measures are in place as appropriate.

As measured by:

Number of countries who have completed/Completion of a national framework and comprehensive oversight system for pathogen biosafety and biosecurity, strain collections, containment laboratories and monitoring systems that includes identification and storage of national strain collections in a minimal number of facilities.

**Human Public Health**

**IHR Monitoring Framework (Core Capacity 4: Response)**

- Safe disposal policy and procedures for medical and nonmedical waste established. (Framework only)

**IHR Monitoring Framework & Questionnaire (Core Capacity 8: Laboratories)**

- National regulations compatible with international guidelines implemented for the packaging and transport of clinical specimens. (8.1.1.9)
- Staff at national or relevant level trained for the safe shipment of infectious substances according to international standards (ICAO/IATA) (8.1.1.12)
- Processes for shipment of infectious substances when investigating an urgent public health event consistently meet IATA/ICAO standards (8.1.1.13)
- Laboratory biosafety and Laboratory Biosecurity (Biorisk management) practices are in place and implemented (8.2.1)\*
- Biosafety guidelines are accessible to laboratories. (8.2.1.1)\*
- An institution or person responsible for inspection (could include certification of biosafety equipment) of laboratories for compliance with biosafety requirements is identified. (8.2.1.5)
- Regulations, policies or strategies for laboratory biosafety are available. (8.2.1.2)\*
- A responsible entity is designated for laboratory biosafety and laboratory biosecurity (biorisk management). (8.2.1.3)
- Relevant staff are trained on laboratory biosafety and laboratory biosecurity guidelines. (8.2.1.4)\*
- Biorisk assessment is conducted in laboratories to guide and update biosafety regulations, procedures and practices, including for decontamination and management of infectious waste. (8.2.1.6)\*

**Animal Public Health**

**OIE Terrestrial Code (Chapters 3.2, 5.6 and 5.8)**

- Veterinary legislation, regulations and functional capabilities, including: Assessment of the adequacy and implementation of relevant legislation (national and sub-national); assessment of ability of VS to enforce legislation; and animal health controls of the importation, use, and bio-containment of organisms which are aetiological agents of animal diseases, and of pathological material. (3.2.14)\*
- Pathogens should be categorized according to the risk they pose to both human and animal health. They are grouped into four risk categories. Detailed information is provided in the Terrestrial Manual. (5.8.3)\*
- Importation of animal pathogens: Import licences should contain conditions appropriate to the risk posed by the pathogen and, in relation to air transport, the appropriate standards of IATA concerning the packaging and transport of hazardous substances. (5.8.4)
- Laboratory containment of animal pathogens: Guidance on the laboratory containment of animal pathogens and on the import conditions applicable to animal pathogens is found in Chapter 1.1.2. of the Terrestrial Manual. Additional guidance on human safety is also found in this chapter. (5.8.5)\*